

COAL AGE

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Putting the Roof on First

By FLOYD W. PARSONS

IT IS necessary to complete a foundation before we can build high and safe. It is slow traveling when we place the cart before the horse. It cannot be denied that some of this Nation's present plans and policies bluntly ignore fundamentals.

The Government has entered on a ship-building program destined to practically bridge the ocean. We all applaud, for we see the necessity. But let us inquire, how are we going to fill the ships if we haven't sufficient locomotives and cars to haul the supplies to tidewater? The slogan "Build Ships" is fine, but we had better add another—"Build Locomotives and Cars," especially the former.

It appears incredible, but it is a fact that the American railroads today are not only attempting to handle the present enormous freight tonnage with practically the same number of cars and locomotives that were employed by these same roads three years ago, but they are using engines and cars that are badly in need of repair. The transportation shortage today is about 150,000 cars. With our present plants, we can manufacture not more than 80,000 cars this year, while 150,000 are necessary to carry out our minimum war plans.

In the face of a railroad construction program that will hardly replace engines and cars going to the scrap heap, it is difficult to avoid questioning the wisdom of other Government officials who plan to build an endless variety and number of war plants throughout the country when present mills, factories and mines are working only part time. Is it not better to bring present plants up to capacity before we clog our already inadequate transportation lines with materials for building additional works?

The productive capacity of all our great industrial regions is limited by the railroad

gateways serving these districts. Let us take for instance the busy Lehigh Valley region in Pennsylvania, where great steel and munition plants are located. It is a fact that if the war works located here were to operate at 85 per cent. capacity it would be impossible for the railroads serving the region to handle a pound of unessential freight. There are other districts that present a similar case, so that it is plainly evident what is going to happen very soon to lines of business not necessary to the conduct of the war.

A further case of building from the top down is shown by the drafting of miners. In one of the most important anthracite districts 2½ per cent. of the entire population has enlisted for war service, whereas the average for the country is only about 1 per cent. The reason for this is that miners constitute a class of men who are disinclined to await being drafted. Hundreds of these men enlisted from each coal district, and later, in arranging the draft, no recognition was given to the fact that these same regions had already furnished their quota. As a consequence, the labor situation in the anthracite field is critical; but, notwithstanding all this, draft boards are still refusing to place these men on a preferential list.

Coal is vital if we intend to play an important part in the war. We must have men to mine our coal, and we must have adequate transportation facilities to get this fuel to our war plants. Even ships, as necessary as they are, should come second.

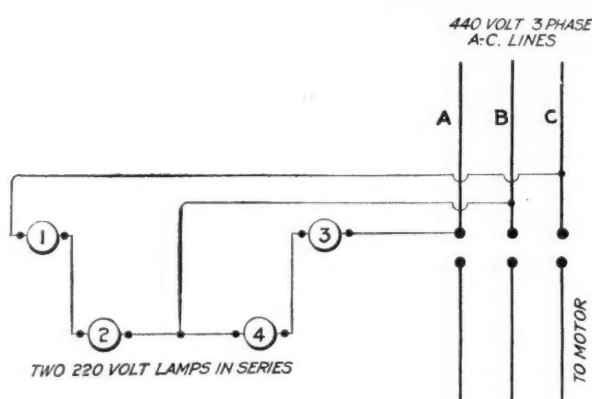
When will the agents of Uncle Sam in Washington see the necessity of building a solid foundation on which to erect our war machine? If the light does not dawn soon, such things as last winter's closing down order of all business will be as a summer zephyr to a tropical typhoon. The outlook was never so bad.

IDEAS AND SUGGESTIONS

A Phase Test Set

BY FRANK HUSKINSON
Lafayette, Colo.

One of the worst troubles experienced with a three-phase alternating-current system is called "single-phasing"; that is, one of the lines may be broken at some point, generally at a set of fuses, or a break may occur in the line. Many small three-phase induction motors



SET OF LAMPS AT EACH THREE-PHASE INSTALLATION

will start equally well on two phases or three phases, and larger sizes will keep on running if one phase goes out.

The result of a three-phase induction motor running on two phases is that the windings will become hot and overheat to such an extent that the insulation becomes charred, and the wires will short-circuit together. Sometimes, also, the insulation breaks down between the windings and the motor frame. In a short time it then becomes necessary to rewind the motor.

In order to avoid starting a motor on two phases, and also as a visual sign that all three phases of the

circuit or lines are right, I am using a set of lamps arranged as shown in the accompanying illustration at each three-phase motor installation, also at each main or branch line switch or fuse set.

A glance at the lamps will indicate the condition of the current. If phase A is open lamps 3 and 4 will not burn. If phase B is open lamps 1, 2, 3 and 4 will burn at one-half candle-power. If phase C is open lamps 1 and 2 will not burn. If all three phases are O.K. all four lamps will burn at full candle-power. A leak in a line is indicated by the lamps on that phase not burning up to full candle-power.

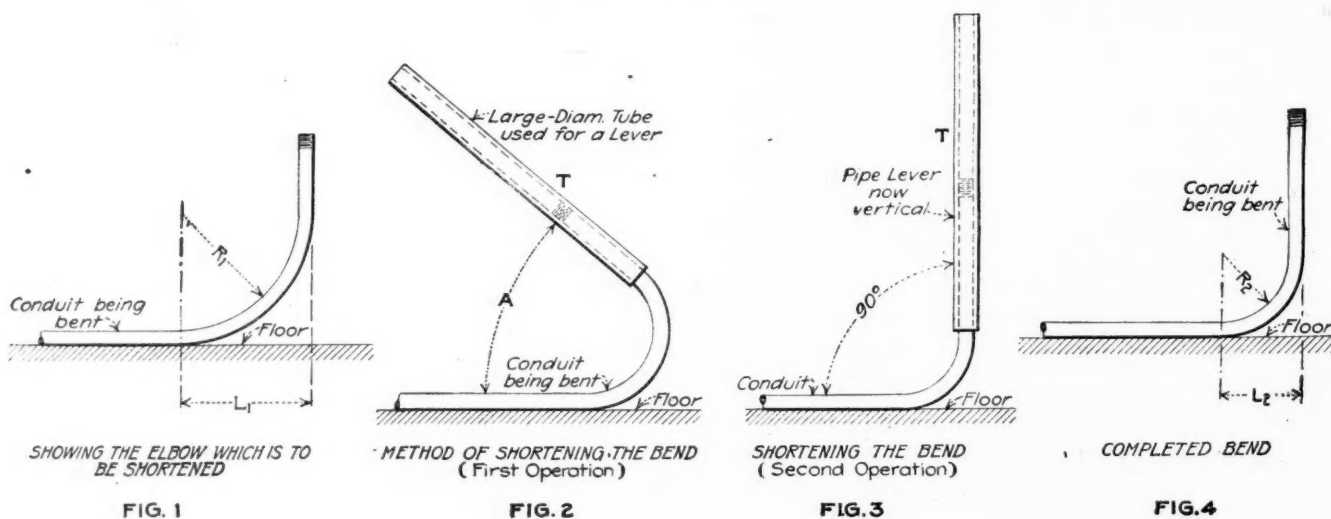
A phase test set should be installed at all alternating-current motor installations, and also at all switches and fuse sets. Such a set will save its cost many times over if it gives a warning once.

A single evidence of carelessness, even though slight, may destroy confidence which has been years in building.

To Shorten a Bend in Conduit

BY LESLIE C. DALTON

To shorten a bend in conduit (Fig. 1) which has already been formed, a tube *T* of such diameter that it will slip over the conduit is used as a lever (Fig. 2) and the end of the conduit, the operator standing on the other end to hold it to the floor, is bent back so that the angle *A* is somewhat less than 90 deg. Then the lever tube (*T*, Fig. 3) is slipped down further on the conduit and the conduit then bent back to a vertical position. Thus the radius of the bend may be decreased from that of *R*₁ of Fig. 1 to *R*₂ of Fig. 4. That is, the offset has been decreased from *L*₁ = 19 in. to *L*₂ = 11 inches. The entire operation is simple.



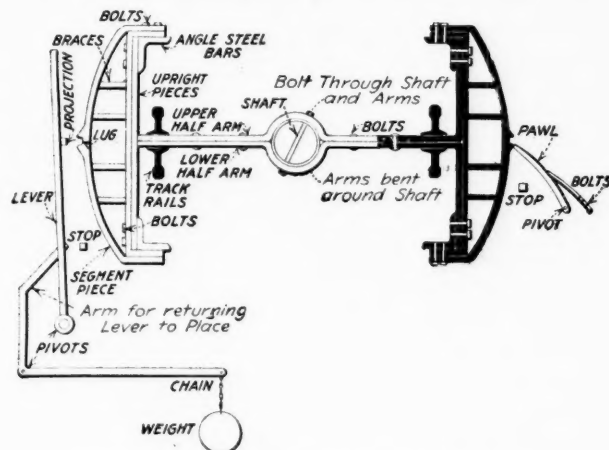
FIGS. 1 TO 4. OPERATIONS FOLLOWED IN ORDER TO SHORTEN A BEND IN CONDUIT

Rotary Car Dump for Boiler Room Coal

By RALPH W. MAYER
Connellsville, Penn.

Dumping coal at the boiler room or at a mine just being developed, which is sometimes a more or less difficult operation, may easily be accomplished by the aid of a rotary dump. Such a contrivance may be readily and inexpensively constructed.

For such a dump as that shown in the accompanying illustration a piece of 6-in. pipe serves as a shaft. Bars of strap iron about 3 x 2 in. are so bent as to half en-



DEVICE ASSISTS THE DUMPING OF COAL

circle the shaft and extend outward at right angles to it. These are firmly clamped in pairs upon the shaft and a hole drilled straight through each pair of straps and the shaft. A bolt is then placed in this hole, which effectually prevents the arms from turning upon the shaft.

At the proper distance from the end each strap is bent at right angles. The bent portion of each strap lies in the same plane as that of its mate, but the two extend in opposite directions. A bar of iron of the same size as that forming the arms is then bolted securely to the bent ends of the arms. About five sets of arms are thus built up upon the shaft, and track rails are securely attached upon each side of the arms.

A piece of angle iron with about 4-in. legs is next bolted across the ends of the bars attached to the ends of the arms. These angle irons, four in all, are parallel to and directly above the track rails and at such a distance therefrom as to permit the tread of the mine car wheels passing between the rails and the angle iron. The edge of the angle will of course then be in such a position as to prevent any considerable sidewise movement of the car by catching against the wheel flange. The angles thus form the track supporting the car when it is upside down beneath the dump. Slight depressions in these angles at the points where the car wheels rest will be sufficient to prevent longitudinal movement of the car.

Two pieces of bar or strap iron are now bent to the proper radius and bolted to the ends of each pair of angle irons at the end of the dump where the loaded cars arrive. These segments are securely braced to the crossbars holding the angle irons.

At the middle of each segment two wedge-shaped lugs are fastened by means of countersunk bolts with a space

of about 3 in. between them. A notch is thus formed upon each segment into which a pawl may drop, thus stopping movement of the dump, while on the opposite side a suitable projection upon a hand lever holds the dump stationary. The pawl is pressed against the segment by a suitable spring while a stop prevents its going too far. The lever pivoted at its lower end is also prevented from moving too far by a suitable stop. The hand lever is pressed against its work by a weighted bell crank the upper extremity of which is bent at right angles to this arm and bears against the lever.

In operation the dump revolves toward the lever. In order to insure this movement the track rail upon this side of the approach is depressed about 4 in. below its mate upon the other side. The rails on the dump meet those of the approach and the car, upon reaching its proper place upon the dump, is slightly tilted toward the lever side. Its center of gravity is thus not directly above the dump-shaft center.

The dump should be made about a foot longer than the car it is to handle. The bearing upon either end of the shaft should be so set as to bring the track rails to the proper elevation. The shaft should extend about a foot beyond the bearing at one end of the dump. Here a wheel or pulley about 12 in. in diameter should be fastened and encircled by a band brake. This brake is used to prevent too rapid a rotation of the dump. It may be operated by means of a foot lever placed near the hand lever so that one operator can handle both.

Another Table Indicator

By HARRY GOODNOW
Duquoin, Ill.

Mr. Gurden has had so many "guides" devised to facilitate the reading of his tables that one more won't hurt him. I accordingly evolved the one shown in the accompanying illustration, which has been found handier than any we have tried heretofore.

A flat piece of cardboard is fitted over any page in the table and marked so that the "minute" indicator on

GURDEN'S TRAVERSE TABLES											
COSINE						SINE					
1°		45'				45'					
1'		09995				0305					
19	18	17	16	15	14	13	12	11	10		
1	2	3	4	5	6	7	8	9	0		
CARD BOARD GUIDE											
1	2	3	4	5	6	7	8	9	0		

GUIDE FOR THE READING OF TRAVERSE TABLES

the finder will come directly under the "foot" column of the tables when the parallel column indicators are under their respective decimals. For reading the tables up a secondary row of figures on the top or a row on the bottom can be used.

The advantage of this guide is mainly in that it puts the minutes and feet together on the paper just as they are usually carried together in the head when glancing from the traverse sheets to the tables.

Byproduct Coke and Coking Operations^{*}

BY
C. J. RAMSBURG [†]
AND
F. W. SPERR, Jr. [‡]

THERE has been so much written and published bearing on the surprisingly large development in the building of byproduct coke ovens that it seems unnecessary further to emphasize this point in detail. Suffice it to say that in the three-year period—Jan. 1, 1915, to Jan. 1, 1918—byproduct coke production has practically doubled, and there has been as much gain in capacity as in the previous twenty years. The cause of this rapid increase has not been a desire to take advantage of the inflated prices for byproducts due to war conditions, but a financial condition favoring large investments brought about by the war, and making it possible to carry forward plans made previously for such development when opportunity presented. That many of the plants have been completed and put into operation at a time when they might take advantage of the high prices for tar, ammonia and benzols is a fortunate coincident and not a contributory cause.

While one is much impressed by the amount of money saved from the recovery of these byproducts and by the stimulus given to the chemical and manufacturing industries by the supply of such an abundance of raw materials, the most impressive fact is the conservation of our coal supply brought about by the introduction of modern methods. It may be of interest to put aside, for the moment, the question of profits obtainable from the sale of ammonium sulphate and other byproducts as materials of chemical industry and to make a few calculations simply from the standpoint of fuel values. To put the matter on the most conservative basis possible, let us figure such values in terms of coal.

Table I shows the fundamentals of the matter from this standpoint. This table shows a total fuel saving of 825 lb. of coal per ton of furnace coke. Please note in this that the fuel value of the gas is put not at its value compared with the coal necessary to replace it with producer gas, which is necessarily made at a low efficiency, but as against raw coal, B.t.u. for B.t.u.

^{*}Presented by Mr. Ramsburg at a joint meeting of the Mechanical and Engineering Section and the American Society of Mechanical Engineers.

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There is a further saving in the blast furnace. Reports from a large number of blast furnace plants indicate that a saving of 200 lb. of coke per ton of beehive coke formerly used is a conservative average figure. Figured back on a coal basis, these 200 lb. of coke represent 282½ lb. of coal at the beehive oven, so that the total saving amounts to approximately 1100 lb. of coal—0.55 ton—for each ton of byproduct coke made in the modern plant.

Since the ovens gained in operation from Jan. 1, 1915, to 1918, will produce practically 16,200,000 tons of coke per annum, it follows that these ovens will save annually to this country the fuel equivalent of 9,000,000

TABLE I. BYPRODUCT FIELDS FROM COAL SUCH AS NOW USED TO MAKE FIRST-CLASS BYPRODUCT COKE IN THE MIDDLE STATES DISTRICT. 85 PER CENT. HIGH VOLATILE, 15 PER CENT. LOW VOLATILE

	Fuel Value Equivalent Pounds of Coal
Surplus Gas: 9,000 cu.ft., 550 B.t.u. Used as fuel.	350
Tar: 12 gal. Used to make creosote oil, pitch, lampblack, various oils and dye materials.	133
To make 1 ton furnace coke 1.4—1.5 tons coal required	
By beehive coking, the by- products wasted have a heat value equivalent to 625 lb. of coal. At least 200 additional pounds of coal are wasted in the process of beehive coking by combustion.	(No fuel equivalent)
Ammonium Sulphate: 33 lb. (or, in form of 25 per cent. ammonia liquor, 33 lb.). Used for fertilizer, for re- frigeration and for nitric acid and other chemical manufac- tures.	42
Benzols (as light oil): 4.5 gal. Used for motor fuel, dye material base, phe- nol and other chem- ical manufacture, solvent and cleanser	100
Coke Breeze: 120 lb. Used as fuel.	
Total.....	625
Add coal equivalent wasted in beehive oven.....	200
Total economy of byproduct oven per ton of coke.....	825

tons of coal. While it is true that the total coal resources of America have up to this time hardly been scratched, nevertheless it is important to emphasize that this saving is taking place in low ash, low sulphur, high-grade coking coal—coal which, from its mining locations, naturally carries the most favorable freight and labor conditions, and as such is of vast importance—to us and to posterity.

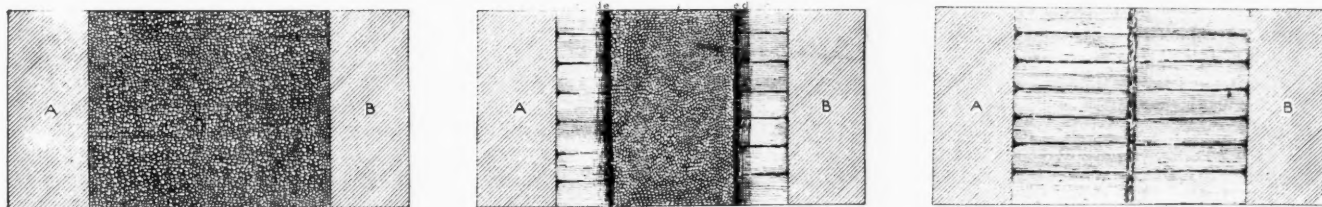
Looking backward over the years consumed in bringing the coke oven to its present stage of development in America, there are a number of events and conditions which stand out preëminently and may be considered as the high spots in progress. The first of these dates back to 1906. In that year the United States Steel Corporation was brought face to face with the necessity of formulating a definite policy as to its coke supply and, in preparation, appointed a committee of its leading engineers and works managers, whose object was to study beehive coking and byproduct coking and to make a recommendation to the company as to the course to pursue after a comprehensive study of the whole matter. This committee did not restrict its investigations to America, but spent a long period in England, Germany and Austria, studying with great care and attention to detail the most minute phases of the various processes submitted for consideration. It has been said that the report of this committee, which was headed by G. G. Crawford, now president of the Tennessee Coal, Iron and Railroad Co., was one of the finest and most complete reports ever presented on an engineering and general technical subject.

The advice of this committee was quickly acted upon

by the corporation in the decision to build a byproduct oven plant at Joliet, Ill., in connection with the blast furnace and steel plant of the Illinois Steel Co., and to build that type of oven which they found to be giving the most efficient results in the European countries.

The success of this Joliet plant was so immediate, not only from a standpoint of economy of coke manufacture, but in the increased blast furnace capacity and efficiency, that the corporation without delay proceeded with the construction of additional plants of the same type, including the largest byproduct coke plant in the world at Gary, Ind., consisting of 560 Koppers ovens, and a plant of approximately the same size as the Joliet plant (280 ovens) at Ensley, Ala., for the Tennessee Coal, Iron and Railroad Company.

The second high spot was the selection of silica material for one of the oven batteries at Joliet. While some silica had been used on other types of ovens previous to this time, the use of it in the ovens of the Koppers type, with their inherent qualities of uniform heating due to their basic heating principles, intensified the value of this type of oven enormously, and put a new aspect on the entire coke situation. The value of the silica in this connection is due to four characteristics:



FIGS. 1, 2 AND 3. DIAGRAMS OF INITIAL, MIDDLE AND COMPLETED COKING STAGE IN BYPRODUCT OVEN



FIG. 4. CHARACTERISTIC BLOCKS OF BYPRODUCT COKE

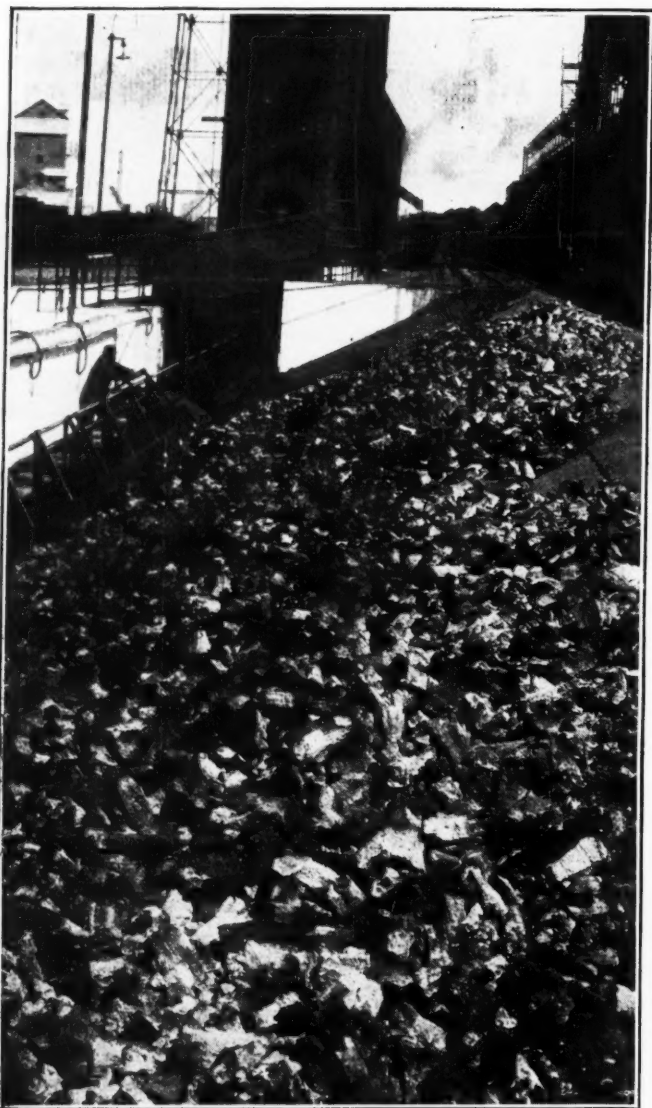


FIG. 5. STANDARD BYPRODUCT COKE ON WHARF AT OVENS

(1) The conductivity at high temperatures is superior to that of clay brick. (2) The fusing or softening temperature is much higher than that of fireclay. (3) The action under heat may be calculated with scientific exactness, due to its practically constant composition. (4) The expansion and contraction of silica material between 2000 and 2600 deg. F. is practically negligible, so that when the material has once been heated to within this temperature range (under which condition the coking operations are conducted) no further appreciable movement takes place.

The Koppers oven is designed to utilize all of these characteristics to great advantage. From the time that the silica battery (one of four) was first built at Joliet, Ill., no Koppers oven has been built in America of any other material.

The third high spot might be better represented by some other simile, since it was more gradual in its development. It consisted in a realization that with uniform heat distribution in the ovens and with the use of silica material much higher heats and consequent higher coking velocities could be employed and, further, that with the lower coking periods higher volatile coals could be used, with increased yields of byproducts and equally satisfactory coke.

The result can be demonstrated by the fact that the Joliet plant of the United States Steel Corporation, put into operation in 1908, was originally planned to use from 70 to 80 per cent. of low volatile coal, and the coking time was figured at 24 hours. The Koppers company is now building at Clairton, Penn., near Pittsburgh, a coke plant for the Steel Corporation of 640 ovens, and the plant is so designed that it may be operated on 15 hours' coking time and is expected to use 100 per cent. high volatile coal. Even if the 100 per cent. high volatile coal proves not to make quite as high grade furnace coke as the coke at Joliet, its use will work out on broad lines to better purpose and time will tell where the comparison lies, after opportunity has been given the furnace operators to adjust themselves to the new type of coke.

The effect on the products can best be shown by reference to Table II.

A comparison in value of byproducts on a basis of normal values shows a credit per ton of furnace coke of approximately \$1.25 in favor of the high volatile coal.

The fourth high spot in development was the awakening to the fact that, while an increase in the cubical content of an oven tends to a reduction in plant cost

TABLE II. YIELDS OF BYPRODUCTS PER TON COKE

	Coal Mixture A. 80 per cent. low volatile. 20 per cent. high volatile.	Coal Mixture B. 100 per cent. high volatile
Tar.....	6.5 gal.	13.5 gal.
Ammonium Sulphate.....	23.3 lb.	38.0 lb.
Surplus Gas (debenzolyzed).....	7500 cu.ft.	10,000 cu.ft.
B.t.u. per cu.ft. gas.....	500	560
Total B.t.u.'s in surplus gas.....	3,750,000	5,600,000
Light oil (benzols).....	2.6 gal.	5.4 gal.

and in operating labor due to handling larger units, a decrease in oven width would more than offset this unit size advantage because of absolutely different conditions.

The reason for this becomes apparent with an understanding of the factors involved. Increased length of oven gives increased cubical content, and the ultimate economic length depends on the mechanical and structural limits. Of increased height the same may be said, except that this involves questions of time of contact of volatile products and speed of their flow which modify the advantage and which are yet to be finally worked out.

Increased oven width involves an entirely different consideration. Practically all the heat supplied for the coking of the coal mass flows from the two walls toward the center. This flow of heat depends, to a large extent, on the resistance and temperature, and in the coke oven the average rate of coking depends, of course, on the rate of heat penetration.

For example, it becomes apparent at once, in a comparison between a 16-in. oven and a 20-in. oven, that the following is true: (a) With the same temperature of wall the average velocity of coking in the 20-in. oven will be less than in the 16-in. oven, and the time required to coke the 20-in. oven will be more than proportionally greater than the 16-in. oven. (b) To coke the 20-in. oven in the same time as the 16-in. oven, the wall temperature must be increased very markedly. (c) To coke the coal in the two ovens at the same average rate, the wall of the wider oven must be considerably hotter than the narrower one. (d) With the same wall temperatures, more coke can be

made per day in the narrower oven than in the wide one. (e) To make the same amount of coke per day, the wall temperature in the 16-in. oven would be lower.

Four points are of great value in this connection: (1) Overcoked material is of less value in a furnace than a greener coke. (2) The wider the oven the more overcoked the outside layers will be and the larger the proportion of overcoked material for a given output. (3) The production of byproducts is enhanced by reducing the wall temperatures. (4) The life of oven brickwork is increased by being operated at lower temperatures.

The result of this reasoning was the decision, in 1914, to reduce the width of oven from 19½ in., average then being built, to 18½ in. Plants of the reduced width are now in operation as follows:

	Ovens
Toledo Furnace Co.....	94
Youngstown Sheet and Tube Co.....	204
United Furnace Co.....	47
River Furnace Co.....	204

There is no doubt among those who have been acquainted with the wider ovens that the narrower oven has the following distinct advantages: (1) Less sponge in the coke. (2) Better coke from the same coal. (3) As good coke from higher volatile mixtures. (4) Higher yields of tar, ammonia, and benzols. (5) Low temperatures for the same coking velocity.

We shall now consider the fifth high spot in coke oven development—namely, the universal recovery of benzols. This may be laid almost entirely to the war, but partly to the increasing demand for motor fuel. It was the war which furnished the primary inducement to developing this phase of the industry; but the fact that the material might be disposed of advantageously for motor fuel after the demand for explosives would cease had an important bearing in stabilizing the investments demanded.

Previous to the war comparatively few plants were equipped for benzol recovery; in fact, outside the plants of the Semet-Solvay Co., operated for their own account, there was comparatively little benzol extracted, and this was used, for the most part, in enriching illuminating gas. Today practically every coke oven plant in America has installed this recovery.

While the removal of benzol reduces the heat units in the gas, the loss in this manner is a very small factor, and the return to be secured from the sale of this product is likely to be greater than that secured from the recovery of tar. One feature of the benzol credit as related to motor fuel is the smallness of the quantity compared with gasoline production, and, since benzol and gasoline are miscible, the utility of benzol will be enhanced by increasing the quantities available.

Experiments recently conducted by a large oil company on its trucks and passenger automobiles proved that not only is benzol more valuable than gasoline as a motor fuel when used straight, but its effective value is increased by being mixed with gasoline. While these experiments are not complete, nevertheless they indicate that a mixture of equal parts of gasoline and benzol gives a value over 16 per cent. greater than that of straight gasoline, which shows 32 per cent. increased value for the benzol half. In 1917 there was produced in this country over 1,000,000,000 gal. of



FIG. 6. TYPICAL BYPRODUCT COKE AT OVENS

gasoline, so, while the value of benzol is stabilized, for this reason it cannot be a very great factor in the motor fuel situation. Every means should be taken not only to secure additional quantities from a standpoint of preparedness, but from a standpoint of motor-fuel supply.

In connection with the value of benzol as a motor fuel there is an interesting fact which may in the future have a very marked influence. Alcohol is in many quarters looked upon as the ultimate fuel, but it cannot be employed except with less efficiency and with greater difficulties, due to its high hydrogen content. Commercial alcohol and gasoline are not miscible. Alcohol and benzol are miscible and make a most efficient fuel, and, further, after the addition of benzol to alcohol the mixture will carry quite a high proportion of gasoline. The future may see benzol as the tie between gasoline and alcohol, permitting a piecing out of the gasoline supply and an introduction of alcohol as a commercial motor fuel.

So much for the introduction of benzol recovery into all coke plants, and for the salient points in coke oven development in America. We shall now take up a somewhat more detailed study of byproduct coke and its use in blast furnaces.

The phenomenal growth of the byproduct industry has stimulated a renewed interest in the main product. This interest is due, first, to the recent revolutionizing

of ideas regarding the relative values of byproduct and beehive coke. The tardy recognition of the fact that byproduct coke of a fairly wide range of origin, when properly used in the blast furnace, gives results not merely as good as, but much superior to, those obtained from beehive coke, was accompanied by a realization that the limit of efficiency had by no means been reached; that Grüner's "ideal performance"—long the *ne plus ultra* of blast furnace men—was actually

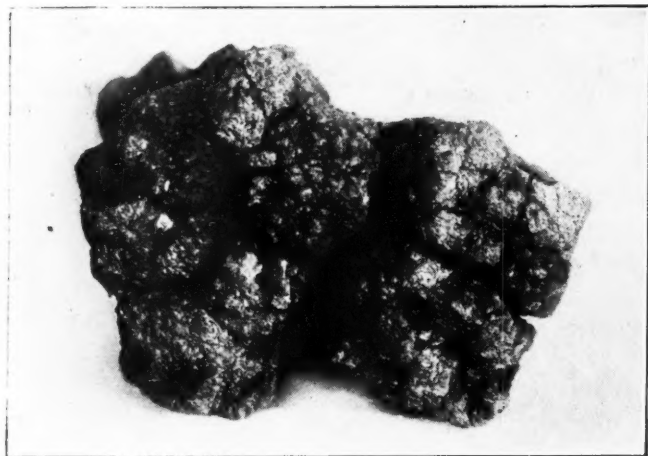


FIG. 7. COKE ADJACENT TO WALL OF OVEN

being surpassed by many blast furnaces, and that much regarding the question of coke economy still remained to be learned. In the renewed study of the subject that this realization is just beginning to stimulate, we have the inestimable advantage that the byproduct coke plants are being located in proximity to, and usually under the same management as, the blast furnaces that they are intended to supply, instead of being placed at the coal mines, long distances away, as was the case with the beehive ovens. Thus the blast-furnace operator knows better the sources of the material that he has to use and the conditions under which it was produced, while the coke plant operator can more intelligently regulate the performance of his ovens and the quality of his product, according to the requirements of the furnace. Above all, the combination and coöperation of the two plants result in a regularity of performance that is perhaps more to be desired than any specific quality of material. It is to be hoped that this coöperation may soon be extended to the foundry and other industries using coke as fuel.

It will assist in following the few descriptive studies of coke that we have to present, to give a brief account of the generally accepted theory of the coking process. The development has received such abundant confirmation from every practical standpoint that there can be no question of its soundness.

Let Fig. 1 represent a section across a byproduct coke oven immediately after the charge of coal is introduced. The layer of coal next to each wall *A* and *B* is rapidly heated. A complicated process of destructive distillation begins, and at a temperature of about 375 to 400 deg. C. the layer becomes soft and pasty. The pasty mass is for a while in a state of violent ebullition, due to the rapid expulsion of its volatile matter, and then rapidly solidifies, the indurated residue retaining the vesicular form and structure of the pasty, foaming stage.

The adjacent layer toward the interior has in the meantime reached the pasty stage, the fusion being assisted by the penetration of some of the soft material forced over from the outer layer. The gases and vapors follow always the line of least resistance and pass through the porous outer layer and up along the wall of the oven instead of forcing their way through the viscous inner portion of the fused layer, and then through the mass of coal. In passing through the highly heated porous layer, the hydrocarbons undergo a partial secondary decomposition, depositing part of their carbon on the cellular surfaces, just formed, thus building up and strengthening the coke. The coking process is thus to be conceived as involving the formation of a fused zone, and the gradual advance of this zone toward the center of the oven, the evolved gases and vapors depositing part of their carbon in the vesicular mass left as the zone progresses. The condition of the material in the oven when the coking has fairly well advanced may be represented by Fig. 2—*c* is the portion already coked; *d* is the fused zone merging into an adjacent zone *e*, which, being in a state of incipient fusion, is more viscous; *f* is the uncoked coal.

The actual thickness of the fused zone is probably not over $\frac{1}{2}$ in. The drop of temperature across this narrow zone is very great, and the interior of the oven remains comparatively cool, even at an advanced stage in the coking process. Simmersbach's experiments on a Koppers oven of 500 mm. (19 $\frac{1}{2}$ in.) mean width, operating on 29 hours' coking time with a final maximum temperature of 1120 deg. C., showed that the temperature in the middle of the oven, 1 meter above the floor, remained about 10 deg. C. for 2.5 hours after charging; then rose to 100 deg. C., and remained

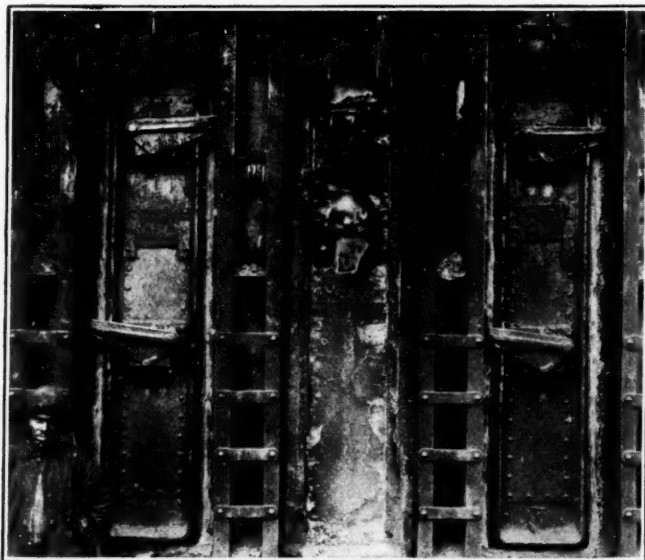


FIG. 8. COKE IN OVEN AFTER REMOVING DOOR

at this temperature until 13 hours after charging. At 20 hours the temperature was only 410 degrees.

The rate of advance of the two zones toward the center of the oven depends principally upon the temperature of the walls (*A*) and (*B*). In present practice, with ovens 18 in. wide and wall temperatures about 1000 deg. C., the average rate is about $\frac{1}{2}$ in. per hour. The initial rate is, however, much more rapid than this, and decreases as the center of the oven is approached.

As the coking progresses, cracks or joints develop perpendicular to the walls of the oven, thus determining the blocks of coke as they are eventually formed when the oven is discharged. These cracks form avenues of escape for a larger percentage of the gases, hence the amount of deposited carbon is greater in proportion on the surfaces of the blocks than in the interior. Eventually the two zones merge at the center of the oven (Fig. 3) and, with the practically complete expulsion of the last of the volatile matter, the coking process is finished. There is always a distinct parting in the center of the oven, so that the length of the blocks is equivalent to about half the width of the oven. Fig. 8 shows a view of the coke as it appears when the door of the oven is removed. Most of the coke immediately adjacent to the walls of the oven is covered with a skin of carbonized pitch. The true form of the blocks may be seen in a few places.

Fig. 5 shows a lot of standard byproduct coke used on one of the lake furnaces as the material appears on the wharf, just after being run out from the quenching car. Fig. 4 shows a closer view of another typical coke. In this figure the individual blocks may be seen more distinctly. A few characteristic blocks are shown in Fig. 4. The three smaller pieces in this figure are cross-sections. The end of the block (Fig. 7) that was originally adjacent to the wall of the oven may always be distinguished by its cauliflower-like appearance and dense layers of deposited carbon. We shall designate it as the wall end and shall call the other extremity the center end, for want of a better term. The structure of the coke towards the center end is always more open, and occasionally is somewhat spongy.

The shape of the coke is quite characteristic, depending upon the coal from which it was produced, and also, to a considerable extent, upon the method of heat treatment. The coke-oven man classes his product as either "blocky" or "fingery," coke of the former character being preferred. Some typically fingery coke is shown in the headpiece. As a rule, the coke from coals of over 30 per cent. volatile matter is apt to have a fingery tendency—and this becomes highly pronounced if the coal has a high oxygen content. By coking such coals very slowly at temperatures somewhat lower than used in ordinary practice, the fingery tendency may be disguised or in many cases entirely eliminated. By disguising it, we mean that the product will actually appear to form large, massive blocks, but these blocks, if closely examined, will be found actually to be bundles of slender pieces more or less firmly cemented together. However, if the heat treatment be very carefully regulated during the coking process—especially in ovens designed and adapted to this particular type of coals—genuine, firm, blocky coke may be made from many coals regarded as producing only the fingery variety.

The size of the blocks is affected to a certain extent by almost all the conditions pertaining to the manufacture of coke. The length is, of course, dependent upon the width of the oven, the average being, on account of shrinkage, a little less than half the width of the oven. The blocks from the top of the oven are usually (especially with high volatile coals) shorter than those from the bottom. Overcoking and high temperatures tend to produce small-sized cok

(To be continued)

Iowa Coal Production in 1917

The production of coal in the state of Iowa during the calendar year 1917, by counties and districts, is shown in the following table:

COAL PRODUCTION OF IOWA FOR THE YEAR 1917
Statistics Given by Counties and Districts

	Total Pro- duction in Tons for the Year 1917	Number of Miners and Loaders Em- ployed, 1917	Number of Other Inside Em- ployees, 1917	Number of Surface Em- ployees, 1917	Total Em- ployees in the Mines, 1917
First District Counties					
Appanoose	1,262,677	2,089	495	299	2,883
Lucas	610,230	526	220	61	807
Monroe (Part)	188,367	182	81	39	302
Adams	19,224	68	6	9	83
Taylor	18,142	48	6	6	60
Page	8,408	37	5	9	51
Wayne	5,122	24	0	4	28
Totals	2,112,170	2,974	813	427	4,214
Second District Counties:					
Monroe (Part)	1,788,822	1,551	551	277	2,379
Marion	521,620	604	208	117	929
Wapello	375,083	412	138	87	637
Jasper	306,386	262	146	52	460
Mahaska	147,967	174	58	40	272
Warren	67,432	27	4	4	35
Keokuk	9,952	15	2	7	24
Van Buren	8,551	18	5	8	31
Davis	1,425	5	0	2	7
Jefferson	355	2	1	1	4
Totals	3,227,573	3,070	1,113	595	4,778
Third District Counties:					
Polk	1,880,812	1,761	689	231	2,681
Dallas	581,391	602	292	95	989
Boone	247,845	365	121	51	537
Webster	22,598	43	19	9	71
Greene	10,062	21	5	3	29
Guthrie	6,950	20	2	5	27
Totals	2,749,658	2,812	1,128	394	4,334
Total Production of Coal in Iowa by Districts for the Calendar Year, 1917					
First District	2,112,173	2,974	813	427	4,214
Second District	3,227,596	3,070	1,113	595	4,778
Third District	2,749,658	2,812	1,128	394	4,334
Total Coal Production for Iowa, 1917	8,089,421	8,856	3,054	1,416	13,326

Production in the State of Washington During 1917

The final figures for the 1917 production of Washington's coal mines as prepared by State Mine Inspector James Bagley show that the mines of the state produced 34 per cent. more coal in 1917 than the year before. The total output for 1917 was 4,002,759 tons, an increase over 1916 of 983,159 tons. Last year's production was the state's largest output, though Mr. Bagley estimates that the 1918 production may reach 5,402,000 tons if the present demand continues throughout.

In 1917 all the coal-producing counties except Whatcom showed increases. King and Kittitas Counties show the largest increases, about 850,000 tons. The coke output was also the largest the state has ever had—96,427 tons—all manufactured in Pierce County.

Five thousand three hundred and forty-three men were employed in and around the mines in the past year. This number worked an average of 271 days for the year, a higher average than the state has heretofore shown. Thirty persons lost their lives in or around the coal mines during 1917.

Every man in the world is a salesman—some good, some bad and some indifferent; some sell ideas, some goods, some service and others pretenses. What do you sell?

Coal Company Organization

Coördination of Departments, Elimination of Red Tape and Efficient Systems Secure Action and Results

BY W. W. BEDDOW

Lundale, W. Va.

WITH the expansion of business, concentration has characterized modern times even to the restriction of trade as our lawmakers viewed it. Later the same legislative body gave the stamp of approval to this method by uniting a whole country's industry under the direction of a high Government official. We have lately had impressed upon us the futility of division of authority and responsibility—the necessity for coördination of departments, elimination of friction—all looking to directness and quick action. The unwieldiness of the cumbersome machinery of large governing boards has also been corrected. In some cases coal companies reflect these ideas, and their methods and successes point to the wisdom of their judgment. Get-together meetings of the officers of a company for an exchange of ideas prove highly beneficial. In some instances office men are sent out into the field and field men are taken into the office, to give each the point of view of the other man. The benefits a large corporation secures through its specialist officials can be largely duplicated by smaller companies combining positions and consulting experts. The adoption of a real efficiency system constitutes one of the important steps in the successful conduct of business today.

WITH the exception of a few of the very large coal-producing companies, there are not many coal corporations whose directors and officers have a definite idea of just what their organization is. The officers of most coal companies would probably be puzzled if they were asked to diagram their organizations; to outline, definitely, the interrelations of the officers, superintendents and foremen of their companies. Their organizations were built up in a manner somewhat similar to the ways our ancestors used to build houses. When starting housekeeping, they would build a four-room cottage, which would then amply suffice for their needs. As their family grew larger, they would add a room here, with a step or two down into it and a room there, with a step or two up to it. In a like manner our coal-producing organizations grew.

Modern developments made advisable the use of electricity in the mines, the use of scientific methods in the employment of men and in the designing of houses, the laying out of towns, the projection of mines, the cleaning and handling of coal and the conservation of by-products. The growth of the companies made it impossible for the chief executive to go into details and give matters his personal supervision as formerly; he was compelled to add a department to inspect operating conditions, raw materials and the product—coal—both at the mines and at the market; it made the purchases of the companies so large that a separate department was added to take care of this function alone; it made necessary the addition of an auditing department to check up the records of the companies and the systems of obtaining these records.

This expansion required the employment of electrical engineers, employment experts, expert architects, landscape engineers, mining engineers, mechanical engineers, chemists, purchasing agents, inspectors and

auditors. And the science of efficiency has come into sight, bringing with it a department for the scientific introduction of efficiency methods. This requires the determination of time standards, material standards and equipment standards to cover all operations necessary for the production, shipping and selling of coal.

Accordingly, the chief executive of every company should have his organization diagrammed as it is and then have it charted as it should be, or as he wants it to be. The next step should be to gradually effect what changes are necessary to accomplish the proposed organization.

The chart of the proposed organization of a producing and selling company is here shown. It is what would probably be called by organization experts a "line and staff organization." Line functions are shown by rectangles; staff functions, by circles. The full lines show line authority, the path of the chain of command; the dotted lines show advisory relations only.

In this diagram, the directing head—the chief line officer—of the organization is the president or general manager. Next in authority to him, in the order named, are the manager of operations, the treasurer, the sales manager and the chief of staff. To these and no others the chief line officer communicates his commands. Thus he maintains the chain of command, which is so necessary to an industry fraught with as many emergencies as coal mining.

TREASURER IN CHARGE OF FINANCES

The treasurer is a line officer in charge of finances. He has line authority over the chief accountant, the chief paymaster and their respective clerks. His relations to the sales manager, the chief of staff and the manager of operations are advisory only. Here note that the treasurer has not line authority over the auditor; their relations are but advisory. It is incongruous to give the man responsible for the finances and records line authority over the man who audits these accounts.

The sales manager is also a line officer. He has directly under him the district sales managers, the traffic manager, the chief billing clerk and the advertising manager. These line officers are advised by the chief of staff and his associates.

The staff and their chief occupy the same position to the president or general manager as the general staff of an army occupy to their commanding general. Their purpose is to maintain the efficiency of the organization at a high point. Their relations to everybody else in the organization, except their own subordinate staff officers, are purely advisory. They have no authority over the line. They should not have this authority for three reasons. First, it would seriously interfere with the chain of command. It would mean a division of authority and therefore a division of responsibility. Second, if the staff were given authority, naturally

they would soon be taking up so much of their time issuing orders and directing workers that they would neglect the thinking, investigating and inspecting parts for which their office was created. Third, a good organization is but a proper system of checks and balances. When the staff is advisory, the line checks the plans drawn up by the staff. When the line acts on its own initiative, the staff checks up. If the staff had authority, it would both advise and execute. The organization would thus lose its system of checks and balances.

The director of employment advises in regard to the personnel of the organization. He recommends to the management the employment of the officers of the company, and he advises the colliery superintendents and

investigates and determines the most efficient ways of working mines, of planning towns, buildings, water systems, drainage systems, tracks, tipples and the thousand and one engineering details necessary for the production of coal.

The auditor inspects the records of the company. He reviews the methods of obtaining and keeping these records and advises the proper officers of his findings. Not shown on the chart are the lawyers, which the chief of staff retains for advice and instruction on legal matters.

It should be noticed in the diagram that the staff advise each other whenever an occasion arises to do so. For instance, a coal inspector finds that they are loading coal at a colliery not up to the standard set for

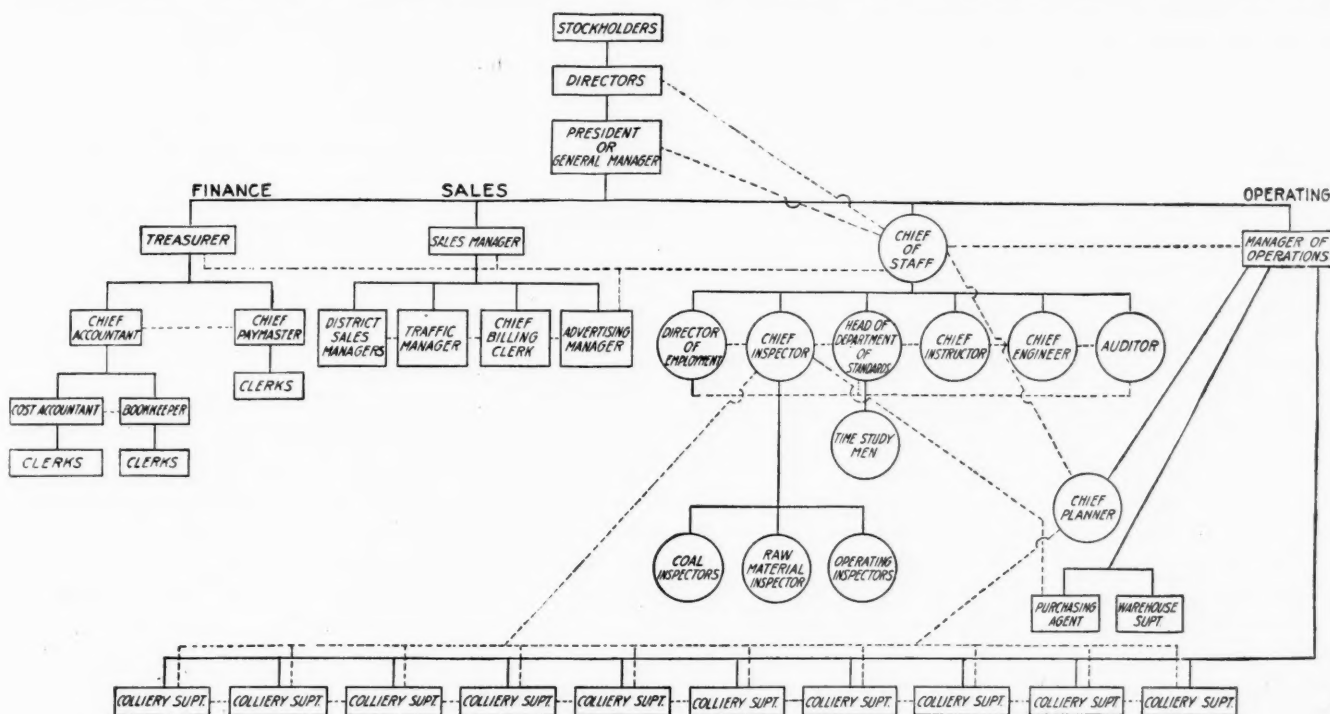


CHART SHOWS THE PROPOSED ORGANIZATION OF A PRODUCING AND SELLING COMPANY.

their employment supervisors. He selects a scientific method of employment, and as his investigations warrant improves it from time to time.

The chief inspector, through his aides, advises the sales manager and the operating department of the quality, cleanliness and loading of the coal; the purchasing agent and other officers concerned of the quality and condition of supplies and equipment purchased or on hand; the operating officers of the efficiency or condition of their respective departments. This department usually takes the yearly inventory and plant appraisal.

The head of the bureau of standards, through his time-study men, advises the line officers of the standards of efficiency which should be set up for each job. He also determines the standard of efficiency of each department, of each colliery, and finally of the whole organization.

The chief instructor advises all department heads and instructors in the instruction of their men and themselves so as to reach the desired standards of efficiency. He prepares the written standard practice instructions to cover each and every job in the organization.

The chief engineer heads the technical experts. He

cleanliness. He first advises the colliery superintendent of this fact. If the colliery superintendent states he cannot remedy the trouble on account of the inadequacy of his tippie equipment, conditions in his mine or other factors beyond his control, then the inspector sends a report covering it to his superior staff officer, the chief inspector, and leaves a copy of this report with the colliery superintendent. The chief inspector reviews the report, and if his judgment dictates he advises immediately the sales manager and the manager of operations. He also advises the head of the department of standards, the chief instructor and the chief engineer. The sales manager has the coal shipped where it can be used; the manager of operations reviews the matter with his superintendent; the head of the department of standards has his standard checked up for this case; the chief instructor sees if anything can be done in the way of improving the method of instruction so as to increase the efficiency of the slate pickers; the chief engineer studies the tippie equipment to see if a remedy can be found in a convenient improvement. The colliery superintendent thus has focused on his problem the expert attention of special-

ists. He very likely makes suggestions, but he need not concentrate his attention on the problem and therefore does not neglect his many other line duties.

The manager of operations is the chief line officer in charge of operations. His superior officer is the president or general manager, from whom only he takes his orders. He issues orders to the next lower officers in the chain of command—the chief planner, the purchasing agent, the warehouse superintendent and the colliery superintendents. He is advised by the chief of staff and his subordinate staff officers.

DUTIES OF COLLIERY SUPERINTENDENT

The colliery superintendents are the line officers in charge at each operation. They rank as assistant managers of operations, and the manager of operations, by a circular, designates the order in which they succeed him in authority. The lines of authority run from the colliery superintendents to the manager of operations and thence back to the purchasing agent and the warehouse superintendent. However, an ordinary requisition would cut across corners, thereby eliminating red tape, by going direct from the colliery superintendents to the chief planner, whose staff would study it with regard to its efficiency; if satisfactory, would forward it to the warehouse superintendent for filling. If the records of the chief of staff showed the requisition to be inefficient, he would advise the colliery superintendent accordingly. However, the colliery superintendent, possessing the authority of assistant manager, could insist upon the filling out of this requisition. In fact, in an emergency the colliery superintendent would telephone the warehouse superintendent and order out a requisition immediately. In any case the superintendent would have to send the chief planner a copy of the requisition for his records. If the chief planner thought that the colliery superintendent insisted, against his advice, on the instant issue of material on requisition, through pure arbitrariness, he would advise the superintendent's superior officer, the manager of operations.

It is evident that the superintendent or any other line officer, if he is the proper one for his position, would accept all the good advice he can get from the staff. By doing so he would certainly increase the efficiency of his colliery or department, and therefore would augment his own efficiency reward. However, it frequently happens that the staff, having a highly specialized and thus naturally narrow view of a situation, advises something which, while very good in itself, is incompatible with the operation as a whole. The line officer, having a broader view of the situation, rejects the advice and tenders his reason for doing so. The staff officer, if he still sincerely believes that if his advice were followed out it would increase the efficiency of the operation as a whole, should take the matter up with the superiors of the line officer, up to the stockholders if necessary. In the meantime the colliery superintendent would conduct the operation as he judged best. The line officer has the authority and must therefore bear the responsibility. If the line officer is arbitrary and resists progress unreasonably, the efficiency of his department and consequently his own efficiency reward is affected. But probably before that time his attitude has attracted the attention of his superior officers and he has been reprimanded, demoted or discharged.

In all organizations the difficult thing to accomplish has been the successful coördination of staff and line. Great strifes have occurred and millions of dollars have been lost by staff officers taking upon themselves line authority and by line officers neglecting their own functions in the performance of staff work. All corporations have likely had their greatest troubles in achieving this coördination.

A high degree of coördination could be obtained by the amalgamation of staff and line. For instance, we might appoint a colliery superintendent as chief engineer for a certain period and make the chief engineer a colliery superintendent; we might let the purchasing agent and the head of the department of standards trade jobs. The experiment should bring forth many gratifying results. A chief engineer often changes his tune when he takes hold of the management of a company. The staff officer would find that it is easier to advise than to do; the line officer would find that it required an immense amount of what would very likely be to him constant, boresome study in order to properly advise. The test would probably result in the true staff officer (doubtless a high, long-headed type) qualifying for a permanent place in the staff; the true line officer (a broad, motive, vital type) qualifying for a permanent place in the line, each one considerably improved by the experience he has been through.

FUNCTIONS VARY IN DIFFERENT ORGANIZATIONS

In the chart the squares and circles represent functions only. In a large company it would likely be necessary for one man or even a man and an assistant to handle each function; in a small company one man could handle several functions. For instance, the chief of staff might also be the chief engineer and the head of the department of standards. The qualifications of the personnel should determine such arrangements. In another method the staff might be committees formed by appointments from the line. There might be a committee on standards, a committee on instruction, a committee on employment, a committee on each of the different technical problems. Such committees would be appointed by the general manager or his chief of staff. It would be unwise to give these committees line authority, as they should act in an advisory capacity only.

Still another way for small companies to obtain the benefits of a good staff organization would be to employ consulting experts for short periods of time. When this is done, however, great pains must be taken to secure the coördination of this casual staff with the line officers—the old or tried and trusted men—of the company. Otherwise, more harm than good will come of their employment. This coördination can be best accomplished by means of get-together meetings where all points of controversy can be thrashed out, where the staff will fully explain the efficiency of their proposed methods and where the line officers will declare their intention to follow or execute these methods.

As mentioned before, every company should carefully plan its organization, first as it is and then as they want it to be. Different conditions will demand different methods. But in every case there should be brought to bear upon the problems offering themselves higher common sense—practical, common-sense experience, combined with theoretical knowledge.

Minecdotes

In Which Bill Miner's Wife Takes a Hand.

Bill Miner's wife was worried, and she was having quite a lot to worry about. Moving from one place to another over quite a stretch of railway, with two or three changes in between, isn't exactly a picnic for a woman with three children to look after; not to mention the bother and upset of tearing up house in one place, getting straightened out in another and the financial outlay involved.

Now things were shaping round for another move before she had well got over the last, according to the tone of Bill's conversation lately: "The pit was rotten, the boss didn't know his business, he gave all the best places to his pets, the company was cheating on the weights, they were overcharged at the store, a fellow would be a fool to spend his time where he couldn't get a square deal if he worked there from now till the crack of doom, and he was going to pull out as soon as he could make it."

"Well, you haven't given them much of a show, have you?" answered she. "We've not been here long enough to get thoroughly acquainted yet, and you've not done bad so far."

"Oh, that's just how they work it," came the reply. "Give a fellow a good place for a week or two to jolly him on, and then as soon as he gets a bit settled put him in a rotten one where he can't make expenses. Why, Tom Jackson says—" what Tom Jackson said made Mrs. Miner wonder how ever any member of the company contrived to keep on the sunny side of the pen—"and he's worked here four winters running," said Bill, as he ended up.

"That so? Put in his summers on the homestead, I suppose?" queried his wife.

"Yes, that's where his folks are," came the reply.

"Well, why don't you ask him up some time, if he's such a friend?" asked Mrs. Miner. "It must be tiresome at the bunkhouse all the time."

"All right, if you say so. It'll be a change. Bye, bye"—and he went, slamming the door quite happily. He hadn't met with any reproaches this time, and it was quite a relief to think of going away without them.

"I thought as much," said Mrs. Miner to herself after her husband had gone. "Another doggone anti as usual, and I'll bet he's got the whole bunch 'on the go.' Gee, some of those boys make me tired. If somebody'd saw their blocks off and roof the rest of 'em in with shingles they'd never know the difference," she told herself disgustedly. "Well, I'll just get busy and do a bit of 'anti-ing' myself for once. Here's one case of anti-itis that'll get stopped before it gets out of hand, or I miss my guess."

A week or two passed, and still the question of moving kept cropping up.

One day Jackson arrived, with another man. The talk was all shop, and since Bill's wife wasn't exactly a fool she could follow most of the discussion with ease, passing a remark now and then, but not allowing anything to get past her. She listened to everything that

was said. "How long have you been mining, Mr. Jackson?" inquired she, when a pause came at last.

"I've worked at that job ever since I knew what work was," came the reply. "There isn't a pit in the country where I couldn't work if I wanted to."

"My!" exclaimed Mrs. Miner admiringly, with a glimmer in the corner of her eye which didn't quite match her manner. "You must have an awful lot of patience to put up with such things. A smart man like you that knows his job from the bottom up and can get work anywhere, with your people settled and all, and only yourself to move, I can't understand why you stay with it. Not only that, but even when you are out you don't stay out. If it was such a whale of a rotten place to work one would think you'd be tickled to death to get out and keep out, and yet they tell me this is your fourth season here and you come back of your own free will. Nobody asked you to. You see," she went on, "it's only likely that men with families and household effects are going to think twice before they'll let themselves in for the expense and inconvenience of a move, when somebody like you can stand it that's got nobody but yourself to shift, and can pack all you need to move in a suitcase."

Evidently this was a new one, and Jackson didn't make much of an effort to answer. Soon after the visitors rose and took their leave.

"Lord! Bessie," grinned Bill when they had gone, "wasn't I a fool not to think of that myself. I guess it's up to a fellow to figure things up for himself a bit, after all. I'll try it out a while longer, anyway."

Determining the Presence of Manganese in Iron and Steel Pipe

In establishing the identity of iron and steel pipe, as used in buildings, the following test for determining the presence of manganese in the sample has been used, according to the A. M. Byers Co., of Pittsburgh, Penn., manufacturers of wrought-iron pipe:

Place in a porcelain dish, preferably a small porcelain crucible, a clean, bright drilling or some filings of the metal to be tested, about the size of a pinhead; add six drops of pure nitric acid, heat, add two drops of silver-nitrate solution, then one crystal of ammonium persulphate not greater than $\frac{1}{4}$ in. in diameter. Warm the solution but do not let it boil. If the metal is steel, a pink color will begin to develop and at this point it should be removed from the source of heat, when a decided red coloration will result. If no coloration develops, but a small amount of dark residue remains in the dish, the metal is wrought iron. Care should be taken at all times to test only clean drillings and to keep dirt or foreign matter out of the dish. If a small thimble-size crucible is used, a match will supply sufficient heat for the purpose.

Manganese, in the process of steel manufacture, has to be added to the molten metal in order to make it possible to roll and weld it into pipe, while wrought iron requires no such manganese addition and therefore usually contains only a trace of this metal. Wherever it is possible to obtain samples, the manganese test can be supplemented by the crushing test, revealing the bright crystalline fracture of steel or the dull gray, fibrous fracture of wrought iron.

Smother the Fire Before It Appears^{*}

By G. J. YOUNG

Assistant Editor-in-Chief, "Engineering and Mining Journal"

SYNOPSIS— *Why not keep coal when in storage under a perpetual dampening atmosphere of carbon dioxide and so prevent the possibility of spontaneous ignition.*

IN a paper presented at the February meeting of the American Institute of Mining Engineers, C. M. Young gave the results of certain experiments and tions upon the proper storage of bituminous coal. He pointed out the limitations caused by the heating of the coal when stored and contributed the valuable suggestion observations upon the proper storage of bituminous coal. He pointed out the limitations caused by the heating of the coal when stored and contributed the valuable suggestion that by the admixture of lump with fine coal heating can be controlled. Mr. Young showed that if air can be excluded from the coal or reduced in amount there will be less heating. The storage of coal under water was touched upon, but the possibility of other methods for excluding air received no mention.

Pursuing the thought that the exclusion of the oxygen of the air is the vital element in the storage of coal, it occurs to me that a gas could be substituted for water and that by this means the difficulties of storage under water might be eliminated. Two gases suggest themselves, carbon dioxide and sulphurous acid gas. Both of these gases are heavy enough to displace air. Of the two, carbon dioxide is the one which promises most, both because it can be cheaply generated and because it is less objectionable than the sulphurous acid gas.

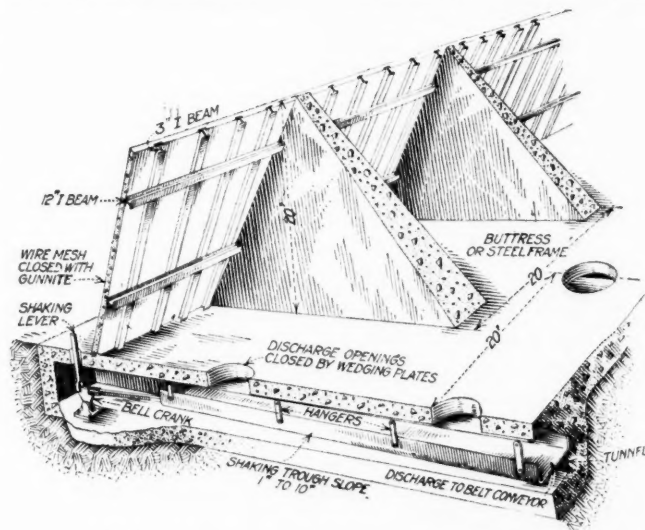
DIOXIDE WILL PREVENT FIRE STARTING

The quantity of carbon dioxide required to fill the interstitial space in coal is comparatively small. If we assume an interstitial space of 20 cu. ft. per ton of coal, it will require 3 lb. of carbon dioxide to fill this volume, which weight of carbon dioxide could be generated from 7 lb. of limestone and 4 lb. of hydrochloric acid, and the cost would be nominal.

It is evident that it would be impracticable to use carbon dioxide in the case of open heaps. To construct bins or bunkers of the ordinary type that would be sufficiently gas-tight to prevent a reasonable loss of gas would be prohibitive in cost. Such being the case, a type of bin departing from usual practice is suggested. A bin to meet the requirements of the case should be exceedingly simple in structural elements and low in cost. These conditions could be met by the use of light side walls inclined at a slope approximating the angle of repose of piled coal. These side walls would be constructed of steel mesh embedded in from 1½ to 2 in. of cement applied by a cement gun, the thin walls to be supported by light structural steel and this in turn supported by reinforced concrete buttresses (or steel frames) which would divide the bin into bays 20 ft. wide. The bin would be placed upon the ground and a concrete floor laid to cover the entire bottom.

To provide for the reclaiming of the coal, a tunnel would be constructed under each bay. Openings

through the floor of the bin, provided with cast-iron doors of gas-tight construction, would communicate with the tunnel. In each tunnel a suspended trough would be placed below the line of openings. The trough would be sloped and provided with a reciprocating mechanism to facilitate the delivery of the coal to a collecting belt conveyor, which would be placed in the center of and transverse to the length of the bay. The belt conveyor would deliver to an elevator, which would



STORAGE BIN IN WHICH COAL IS SMOTHERED
Coal is surrounded, not supported, by the reinforced-concrete side walls

discharge into loading bins placed at such a height as to secure convenient discharge into motor trucks or other vehicles. The filling of the bin could be accomplished from a bridge constructed along the center line of a series of bays or by means of conveying appliances.

For the operation of the shaking troughs beneath each bay, a car carrying an ordinary machine drill, operated by compressed air, could be used. This car would be shifted from bay to bay as required, and attachment would be made to each shaking bar. A compressed-air main would be required on each side of the bin. Significant features of the bin are shown in the sketch. Other methods for reclamation are also available.

To provide for the introduction of the gas a gas main would be placed close to the center line of each bay and a number of outlets at symmetrical points provided. Connecting with the main would be a delivery pipe which would extend from a central generating plant.

Assuming a width of bay of 20 ft. and a ground length of 120 ft., the approximate storage capacity for a height of 20 ft. would be 1000 tons. The ground area required would be 3 sq.ft. per ton of storage capacity. The cost of construction, roughly approximated and including all features except the central bridge and the gas system, would be \$3400, or \$3.40 per ton of storage. For a pile 40 ft. high, 2 sq.ft. ground area per ton of storage capacity, and a cost of \$3.15 per ton of storage capacity, are obtained.

If an annual depreciation of 10 per cent. and an interest charge of 10 per cent. be assumed, the cost of

^{*}From "Engineering and Mining Journal."

storage per year is estimated as follows for the 20 ft. pile:

Depreciation and interest.....	\$0.68
Interest 10 per cent. on coal at \$5 per year.....	0.50
Unloading and loading.....	0.30
Depreciation and interest on bridge.....	0.20
Land rental 10c. per sq. ft.....	0.30
Total.....	\$1.98

For a 40 ft. pile, the estimate is \$1.58, including all of the items given in the estimate of the 20 ft. pile.

In gassing the pile, the bin would first be partly filled before the introduction of the gas. As the bin was filled, the gas could be gradually introduced. After completely filling, a top layer of fine coal would be spread evenly over the whole surface so as to prevent diffusion of the gas as much as possible. Over the top a waterproof tarpaulin or roofing felt could be securely placed. At intervals more gas could be forced into the pile, so as to compensate for losses.

In the estimate I have not included the cost of the top covering nor of the gas. The type of bin suggested would prevent leakage, and diffusion at the top would be greatly retarded. The top area of the bin for a 20 ft. pile would be 1.6 sq.ft. per ton of storage capacity and for a 40. ft. pile, 0.5 sq.ft. The superior advantages of the 40 ft. pile are obvious. The costs given are tentative only. I know of no example of the use of carbon dioxide in the way described and believe the plan to be feasible. There is an additional fact that makes the use of carbon dioxide as a submergence agent especially advantageous. Both oxygen and carbon dioxide are adsorbed by carbon, but the latter is more readily adsorbed and in greater relative quantity at a given temperature than the former. It can therefore be inferred that the carbon dioxide adsorbed by carbon would displace any adsorbed oxygen. Without much doubt adsorbed oxygen plays an important part in spontaneous combustion. Whether coal would be as energetic in adsorbing carbon dioxide as pure carbon must be experimentally determined.

Washing Furnace and Domestic Ash for Fuel Recovery

BY MARK MEREDITH

Liverpool, England

In operating boiler and other coal furnaces there is a considerable loss of fuel through the grates as a general thing, while in the domestic ashes sent to the destructor there is possibly quite 25 per cent. of fuel that could be recovered. In some places both furnace and domestic waste is sorted by hand, and some fuel thus recovered, but of late years the chief object aimed at appears to have been to destroy everything but the ash and clinker, these being variously disposed of in the quickest way available. Possibly from many points of view this is advantageous, but none the less it is wasteful; and probably, when the present times of lavish expenditure have passed, some other method of dealing with waste will be adopted.

In dealing with ordinary furnace waste all hard clinker should be kept separate for road or concrete making and other purposes for which hard material is needed, while all fine dust passing a mesh of from $\frac{1}{8}$ to $\frac{1}{4}$ in. should be screened out, the coarser refuse being then treated to recover the actual fuel.

The solid waste from domestic collections should be similarly dealt with, although this would need more

apparatus in the shape of screens to remove the light stuff, much of which has a commercial value, locality having much to do with this, however. In any case the fuel recovered would pay for all work undertaken in a business-like way, and for this reason it is practically certain that private enterprise would give better results than are usually obtained with municipal enterprises.

The principles of separation would be those used in jig washing. The crude material would be first sized and then passed through jigging machines. The fuel passing the machine could be elevated into hoppers for draining and delivery into wagons, the ash and dirt being deposited where desired.

The waste from the hutches, which would vary in size from a $\frac{3}{16}$ to 1 in., would be available for making tar-paving after it had been dried. It could be conveyed automatically to a convenient dumping place for use as required while, roughly, the only part of the solids which would pass to actual waste would be the fine ash and dirt, of which probably there would be a larger amount than could be put to practical use.

It is not a profitable proposition to handle small bulks in a plant costing from \$7500 to \$10,000, but anywhere up to, say, 100 cu.yd. per day of purely furnace refuse could be dealt with, and in domestic collections probably larger bulks could be readily secured in most places of any size. With domestic waste, however, all garden and other nonmineral refuse would have to be excluded.

To those who are interested in the utilization of domestic waste the municipal ash yards offer a good opening. Even after all of the larger pieces of metal and the few other things usually collected are taken out there is a large amount of valuable material left untouched, which either goes into the destructor or is hauled or barged away in the ash and waste. The money value thus lost is considerable. There should be no necessity to have fleets of barges to carry valuable waste products out to sea, and lose them by dumping, when they might be utilized if a little care was taken.

All combustible substances burn slowly in an atmosphere of highly diluted oxygen, but in the case of soot this slowness is much more pronounced. The reason for the very slow combustion of soot in highly diluted oxygen probably lies in its complex molecular structure. It is commonly supposed that a molecule of soot consists of a considerable number of atoms, and that a similarly large number of molecules of oxygen is required to come in contact with the molecule of soot before the latter can combine with the oxygen. The chances of the molecule of soot finding this large number of molecules of oxygen in the furnace gases are small, and hence the slow combustion. Thus assuming the molecule of soot to consist of 12 atoms and represented by the symbol C_{12} , there will be required 12 molecules of oxygen to burn the one of soot. The reaction for the combustion of the soot may be expressed by the formula $C_{12} + 12O_2 = 12CO_2$. For comparison the reaction for the combustion of CO is given in the following equation, $2CO + O_2 = 2CO_2$.—Bureau of Mines Bulletin No. 135.

Mine Trackage for Motor Haulage

By DEVER C. ASHMEAD

Tarrytown, N. Y.

SYNOPSIS—*The condition of the haulage tracks exerts a great influence on the operation of any coal mine. Frequently the proper or improper construction and maintenance of the tracks mean all the difference between profitable and unprofitable operation. Here, as elsewhere, certain maximum and minimum limits obtain. Crossing the maximum limit means unnecessary expense; crossing the minimum limit means trouble.*

THE successful operation of any kind of locomotive haulage—whether trolley, storage-battery, gasoline, steam or air—depends largely on the condition of the track. This is particularly true in a mine. No matter how perfect the locomotives may be, delays, wrecks and breakdowns will occur if the track conditions are poor.

Although the main features to be discussed in this article have been described again and again, they cannot be emphasized too often, as in more cases than one the failure of a mine can be traced directly to poor track. Labor troubles have also arisen from this same cause, when the men have not been able to get a proper turn owing to the inability of the locomotives to get the mine cars to the faces in sufficient number.

The first thing to be considered in mine haulage is the width of the headings in which the locomotives are to operate. These passages cannot, in an ordinary sense, be too wide. There must be sufficient space on each side of the locomotive to allow plenty of clearance, which should be enough to permit the moving locomotive to pass a man safely. There should be room enough in case of a wreck so that the men will not be crowded while working. For a 36-in. gage track the heading should be 10 ft. wide; for standard railroad gage the heading should be between 14 and 16 ft. in width.

SOMETIMES PROFITABLE TO WIDEN HEADINGS

In many old mines the headings were driven only 7 ft. wide, and in one case of which I have knowledge only 6 ft. If motor haulage is to be employed in such a mine it may be necessary to widen the headings by slabbing. Whether or not this would pay depends largely on conditions, such as the cost of slabbing, the cost of changing timbers, the amount of coal recovered, and on what sum of money would the saving resulting from the installation of locomotives pay interest.

The second point to be considered is the material used in the construction of mine track. Here the kind of rail is of the utmost importance. If the rail is too light and the ties are spaced too far apart surface bends are likely to occur, making the track rough and "bouncy." A few rail size limits may be given for locomotives of different weights. For a 4-ton machine the rail should weigh between 16 and 20 lb. per yard, for a 6- or 8-ton motor from 20 to 30 lb., for a 10-ton motor between 25 and 40 lb., and for a 15-ton motor not less than 30 lb.

Of course, the heavier the rail employed the better will be the track, and some mines even use rail weighing as much as 80 lb. to the yard. This statement concerning rail weight is true with one exception, and that is on hauls where storage-battery locomotives are used. Here the rail should never exceed 45 lb. to the yard, for when sand is applied to such large rails the locomotive cannot slip its wheels readily and there is danger of the motor burning out. In order for the locomotive to slip its wheels a larger motor would be necessary, therefore a larger battery, which in turn would only increase the size of the locomotive and make it larger than would ordinarily be necessary to do the required work¹.

Next in order of importance come the ties. Outside of the average mine a visitor can usually see a pile of wood from 4½ to 7 ft. long, and he often wonders what use can be made of it. The sticks are too light to serve for props, and when he asks what it is for he is surprised to learn that it is a pile of ties. Ties should have two parallel sides and be reasonably straight, but the usual mine tie is triangular and crooked.

SOME HINTS ON SPACING OF TIES

A good tie should be from 4 to 6 in. thick and have a face from 6 to 8 in. wide. The two bearing sides should be parallel whether sawed or hewn, and the tie should be straight. It should be long enough to extend 1 ft. beyond the rail on each side of the track.

The correct spacing of ties is of great importance and will vary according to the size of the tie, the weight of the rail, the weight of the load to be hauled and the concentration of load on the driving wheels of the locomotive. Whatever spacing is adopted should be followed out. Ties should not be placed far apart in one place and close together in another.

Two methods for spacing the ties can be employed at joints. If the rail is light, it might be well to have one broad tie under the joint; but if the rail is heavy, two ordinary ties should be used so that they can be placed properly at the end of the fishplate. The placing of ties at joints in this manner lessens the liability of low joints and the wrecks that can be traced to them.

The subject of spikes is worthy of some consideration, as the selection of the wrong size of spike often leads to wrecks and wastage of material. There is no specific rule governing the selection of spikes, and this has to be left to the judgment of the user. Too small a spike will not have sufficient hold, and the rails are liable to spring loose and a spreading track result. Too large a spike is liable to split the tie and allow it to rot more rapidly and cause the same spreading of rail. In order to select a spike intelligently the following facts should be considered: The weight of rail, the size of tie, the kind of wood in the tie and the amount of traffic that will pass over the road.

¹As considerable difference of opinion appears to exist on this subject among engineers, most men preferring as heavy a rail as possible, "Coal Age" would be glad to receive comments and discussion of the statements made in this paragraph.—Editor.

Many mine managers neglect to see that all fishplates are in place and bolted tight. Quite often when the tracklayer is building track he runs out of fishplates, and he does not bother to obtain more. Kinks are apt to appear wherever fishplates are omitted, and this means that there is a chance for the wheels to climb the rail or that the rail be shoved out of place. In either case a wreck may result.

More wrecks are likely to occur at the switches in a mine than at any other point, and in a large percentage of mines anything that a locomotive and cars can pass over serves as a switch or a frog. Many mines endeavor to make their own switch points, frogs and stands, but unless a fully equipped machine shop with a large-size planer is available this should never be attempted. No matter how skillful a blacksmith may be he cannot make these articles as well as they can be turned out in a machine shop or factory where the manufacture of this class of apparatus is a specialty.

KIND OF FROGS AND SWITCH POINTS TO USE

A frog for mine work should preferably be of the riveted plate type, as this possesses the advantages of simplicity and strength. A frog with an angle greater than a No. 4 should not be used except in rare cases. Switch points ought not be less than 5 ft. long and should have two bridle bars. Switch stands should be used on all main-line switches, but they are not absolutely necessary at room switches. A switch stand sufficiently high and properly arranged so that it can be thrown by the motorman would be of great assistance at a room switch. It is advisable to place spring connecting-rods between the switch points and the switch stand. If these rods are used they will often prevent switches from breaking, as the motor can run through the switch when it is thrown the wrong way.

The time lost through a single wreck on a switch, not to mention the possible damage, will usually cost more than the purchase and installation of two or three switches. This can be well exemplified in the case of two plants in Illinois. These two mines were opened in the same bed of coal, at the same time, on adjoining properties. The shafts were the same depth. The coal was the same thickness. The equipment throughout was practically the same. The same mining system was used. One mine had an output of 5000 tons a day and the other but 2000 tons. The management in both cases was the best that could be procured, but the results obtained were hardly comparable. The management of the mine with the smaller output requested the other company to send its manager to examine the mine in order to determine if he could locate the cause of the small tonnage.

This man spent one week at the plant, and when he was through he made a report in which he stated that as far as he could see both mines were identical in every way except one, and that was that the mine with the smaller output had an abnormal amount of wrecks. These wrecks kept the output down and the cost up. The cause he attributed to the frogs and switches, which were homemade. The only recommendation he made was to replace these frogs and switches with manufactured ones. The company followed his recommendation and in a year's time its output had increased to 4000 tons a day.

Next to be considered are the curves. The curves from the main entry to the cross-entry and from the cross-entry to the butt-entry should be of as large a radius as possible. This should be 30 ft. or more, and in no case should it be less than 25 ft. Curves of these radii apply to all points where the locomotive travels at any considerable speed or around which it pulls or pushes a trip of cars. The greater the radius when pushing the better, particularly where double-bumper cars are used, as there is then less danger of the bumpers locking and causing wrecks.

The radii of room curves do not need to be as great as those mentioned above, but they should not be less than 20 ft. for a locomotive with a wheel base of 36 in. A larger radius should be employed for a larger wheel base. In every mine the entry and heading curves should be laid out by the engineer with a transit, the center line of the curve from which the trackman can take his points being marked on the roof.

The fourth consideration in the construction and maintenance of mine track is the alignment. The more straight and even a track is kept the less is the chance for wrecks. Some companies have their sights for driving the headings placed in the center. The engineers connect these points with a string and paint a white line on the roof above this string. This gives the trackman the center of his track. The careful following of this line, together with a close adherence to curves, will result in a properly located track.

The fifth consideration is the ballasting and drainage of the track. A track that is poorly ballasted will not keep good alignment; and one that will not keep alignment is one on which wrecks occur, since it gives points at which the flanges of the wheels can climb the rail.

PROPER BALLASTING SAVES MINE TIES

The ballasting should be thick enough so that the ties will not rest on the bottom. The ties will thus be kept away from excessive moisture. If the mine is wet a good ditch should be provided and kept clean. This ditch should be deep enough to prevent the water in it from soaking the ballasting and should be on the trolley side of the track so that the men will walk on the opposite side away from the wire and its dangers.

The space between the ties and the rib on the opposite side from the ditch should be kept clean and free from loose coal and rock so that it can form a free and unobstructed man road. If the heading is the proper width this space between the ties and the rib will be from 3 to 4 ft. wide.

The sixth consideration regarding mine track—the elevation of the outer rail on the curves—has probably received the least attention. Most wrecks in mines occur at one of two points—the switches and the curves. The wrecks on curves can be eliminated almost entirely if their alignment is correct and if the outer rail is elevated to the proper height. This height depends on the speed at which the locomotive takes the curve. A number of tables given in various books on mine haulage tell what these elevations should be for the degree of curvature and the speed of travel. It will therefore be unnecessary to repeat such data here.

If a mine track meets the conditions stated above the danger from wrecks will largely disappear, haulage costs will be low and the output large.

It would probably surprise many operators to learn what a powerful influence the condition of mine track has on the labor situation, particularly as regards the miners who are paid by the ton. Remarks like the following are often heard as the miners leave the mine in the afternoon: "I could have loaded more coal if I had the cars"; "That motorman is as slow as molasses"; "I did not make enough to pay for the powder I use"; and so on *ad infinitum*.

Did you ever consider the cause of these remarks? If you did, how many times have you found that a wreck or two had stopped production from a heading for a couple of hours, preventing the men from receiving their proper turn? Did you ever investigate the cause of that wreck? If so, did you ever try to remedy the trouble?

Did you ever analyze the reason why the miners demand an increased wage? If you did, you would find that their demands do not always arise from the fact that they are not receiving enough for each ton mined, but because they are not able to mine enough tons.

If the miners were supplied with steady work each day of the week and were given a sufficiently large turn each day they would have been able at their old wages to load a sufficient number of tons to give them a satisfactory week's pay. As they do not get this they are compelled to ask for sufficient wages per ton of coal so that the amount of coal mined will produce enough money to take care of their wants.

There are two ways in which operators can remedy this condition, but in this article we are interested only in one. If the operator can furnish his men with a good turn he will have partially remedied the situation, for the miner will realize that the operator is doing his part. The operator, in order to provide the better turn, should see to three things: (1) That the mine track is in proper condition, (2) that sufficient motive power is available and (3) that he has plenty of mine cars. Unless the track is good it does not make much difference about the other two items, for locomotives and cars cannot travel rapidly unless the track they traverse is maintained in proper condition.

Big Foreign Coal Trade After War Is Over*

By J. H. WHEELWRIGHT

President Consolidation Coal Co., Continental Building,
Baltimore, Maryland

SYNOPSIS—*Importance of finding just what coal the purchaser's conditions demand and of being ready to enter the market when the war comes to an end so as to anticipate readjustments in European countries whereby American coal may be rendered unnecessary. The need for American shipping, for better maritime laws, for a readjustment of international credits, and for better banking facilities is given as reasons for our past restricted coal sales in Europe.*

WHEN the war is successfully concluded, there will be opened up to America a wonderful opportunity to further expand her exportations of coal. The splendid progress made in the early stages of the war in introducing American coal in foreign markets and the further extension and strengthening of its position in markets that had already been more or less established—now at a lull for reasons with which we are familiar—will give us an opportunity of pushing our coal. Our fuel is now beginning to be known in the markets of the world, and foreign buyers will not look upon it in the future as an experiment and often a costly experiment, but as a commodity having proved qualities particularly adapted to their requirements.

Many of the unfavorable conditions with which the American coal exporter had to contend will be removed or greatly remedied. A few of these may be enumerated: (1) Lack of knowledge of the quality and character of our coals by foreign buyers. (2) Lack of vessels under the American flag to transport our product. (3) Unfavorable maritime laws, making it im-

possible to construct or operate vessels in competition with vessels under foreign flags. (4) Adverse credit balances, and the absence of proper exchange facilities in the countries to which the coal is to be transported.

Great strides have been made in solving the first difficulty in the course of selling the large amount of coal exported early in the war, at a time when conditions made only American coal available to foreign consumers. Its quality, character and preparation fully and satisfactorily met the requirements of foreign countries whenever it was intelligently supplied. This latter feature should be jealously watched, and pains should be taken to ascertain from the buyer for just what purpose the coal is to be used, as the use of the wrong kind of coal is such a costly mistake as to make a customer reluctant again to give it a trial. This feature alone in many communities has given American coal a bad name such as it does not deserve.

The second unfavorable condition is being rapidly removed by the construction and acquisition of a large fleet of vessels by both our Government and individual capital.

The third incumbrance will doubtless be lifted when the crying necessity for an adequate merchant marine has been forcibly demonstrated and when, at the cessation of hostilities, we find a large investment of Government and private capital in vessel tonnage. Then surely a revision of the present laws will be made which will place our vessels where they can fairly compete with those under other flags.

The fourth difficulty has already been solved by the readjustment of international credits. This has gradually taken place during the progress of the war. Furthermore, banking facilities abroad have been established by our large fiscal institutions, and branch offices have been opened in the important centers of all foreign countries. This would appear to have placed us on an

*Paper read before the National Foreign Trade Council in Cincinnati at its meeting held on Apr. 18, 19 and 20.

equality with our competitors in the important item of credit and exchange.

With some of the obstacles removed, and with the entering wedge already made, we must be prompt to take advantage and make the most of the pioneer work already done the moment the opportunity presents itself. Immediately after the termination of the war I believe there will be a tremendous world-wide demand for coal, as most countries, including our own, have practically no stocks available. Unquestionably foreign trade will only be limited by the ability of the mines to produce coal, the ability of transportation facilities to deliver it and the ability of labor to mine it.

It looks as if we would have a ready export market during the period of reconstruction for all the coal we can ship, as the producing countries of Europe will feel the effects of depleted man power. In many sections, furthermore, it will take a long time to restore to anything approaching normal production the properties that have been devastated by the war.

By the time the war is successfully concluded this country should be in a position she has never been in before. She will have American vessels to carry coal and other exports to foreign countries and to bring back such of their products as we import. This will place us on a more favorable basis insofar as marine rates are concerned and, in addition, the experience we have had since the war began in the shipment of huge tonnages abroad will have taught us how they may best be handled, while adequate international banking facilities will enable us to handle them.

Indeed, the question in my mind is whether we will have at that time the production of coal sufficient to enable us to supply the demands made upon us by foreign countries. If we have not it would be a great misfortune; for, as I have said before, it is of the utmost importance that we should be prepared and prompt to supply any demand arising. Unless American coals are supplied immediately, and foreign nations are thus prevented from returning to their old sources of supply, it will be difficult to displace them.

The mines of America have the capacity to meet such an emergency, and it seems that the vessel tonnage will be available. Therefore, the question seems to resolve itself into our getting the coal loaded on cars and transported to tide—a matter of transportation and labor. The inadequacy of the railroads to handle the tonnage of coal which can be produced in this country has been strikingly demonstrated during the past year, and not only the Government but the people at large now realize a situation which has been known and proclaimed by the coal industry for years.

We have faith in our Government, however, that when a condition has been so fully demonstrated an effort will be made to remedy it. Already we find concerted effort to improve the railroad facilities of the country by a unification of systems and terminals, as well as by many new methods for the handling of such commodities as coal, the purpose being to improve the unfortunate situation that has so long existed. In all probability, at the end of the war, there will be a let-up in the home demand and many men who have left the coal-mining industry for work in munition and kindred employment will sooner or later be seeking their old vocation of coal mining.

Pittsburgh Coal Co. Report for 1917

The Pittsburgh Coal Co.—the premier miners and shippers of coal—reports in its last annual statement to its stockholders that "the year 1917 was disorganized throughout in demand, costs, prices and distribution. The light stocks carried over, general business activity, severe winter weather during the first quarter, followed by the entry of this country into the European war, together created an insistent demand from the beginning, largely added to cost of production, and raised general selling values to an unprecedented level. All these governing factors were aggravated by railway inability to render usual service caused by abnormal general traffic, preference movements and other adverse conditions, thereby reducing the output of the mines and work of its employees much below requirements of expectation and necessity after a large increase of plant facilities and unremitted effort on the part of the whole organization of the company."

The experience of the Pittsburgh Coal Co. as regards disturbance to the operation of its mines due to abnormal causes has been shared by most if not all coal companies, the most acute situation being reached when the railroad administration made contracts giving 100 per cent. car supply to certain mines in return for cheap coal, a practice resulting in unequal distribution of available cars, reduced production and labor unrest at mines where, through car shortage, working time was seriously diminished. In the face of great uncertainty, many of the big coal producers have adopted a policy of extension and are preparing for increase of tonnage over record production of 1917. Thus far coal shipments during 1918 have been less than for a similar period last year, owing to the failure of transportation.

This report of the Pittsburgh company was not published until about the first of March, and its comments on the situation of the first two months of this year are extremely interesting at this time. The report states: "So far this year (1918) company production has fallen off 20 per cent. below the same period of 1917, adding so much more to the existing general coal shortage to be made up with nothing more to depend upon but trust that conditions will turn more favorable in aid of strenuous efforts to effect it. The coal must come out and be moved nearer to the supply of the needs of the country for the remainder of the year or the distress and trade disturbance of 1917 will be increased under the record so far made."

Continuing, the Pittsburgh company says: "Increased coal prices, higher wages paid in other industries and increase in living expenses disturbed labor and made necessary two large advances to all employees within the year, and costs of material and supplies also sharply advanced. While 97½ per cent. of full productive capacity was kept in steady commission, actual output represented the use of but 50½ per cent. And while the working force was reduced about one-third in number on the average through the year, there was practically no labor shortage. Facilities were increased by the opening of two other mines. The plants and equipment everywhere have been maintained in an efficient condition and no serious accident has occurred."

The total tonnage produced and handled for 1917 was 18,388,739 net tons, a decrease under 1916 of 317,705 tons or 1.7 per cent. A greater unmined coal content remained at Dec. 31, 1917, than was owned on Jan. 1, 1916. A material addition to the coal reserves was made during the year by the purchase of 8042 acres of coal rights in excess of sales. This makes the total owned and leased acreage of unmined coal of the Pittsburgh Coal Co. amount to 237,800 acres. The report further states:

"There has been a large increase in personal injury payments since Jan. 1, 1916, when the Pennsylvania law became effective, as every accident becomes a claim for adjustment. To carry this risk and provide against extraordinary ones, a fund has been set aside out of earnings as of Jan. 1, 1916, based on the rate for such risks fixed by the Employees' Liability Insurance Department of the State of Pennsylvania."

"The [employees'] pension fund amounts to \$197,706.13, of which \$187,405.98 is invested in the preferred stock of the [Pittsburgh] company and United States bonds, and there are 100 men drawing pensions. Payments into and out of the fund were increased during the year [1917] and it is also on a satisfactory basis for the present." The report relative to the Pittsburgh company's Employees' Association is also interesting

and at the same time a further illustration of the spirit of cooperation between employer and employee. "Since this association was formed there have been subscribed for, paid and delivered 4791 shares of preferred and 2236 shares of common stock; and there are now under subscription 7420 shares of preferred and 4724 shares of common, or a total of 19,171 shares of both classes from its inception."

"A revision of the contract with the United States Steel Corporation entered into Apr. 1, 1905, for a term of 25 years, and which had become during 1916 a source of loss to the company, was made effective Feb. 15, 1917, for the balance of the original contract period at prices and on conditions insuring more favorable results for the future . . . , and with the further result of influencing the revision of other term contracts." This establishes a precedent which may have an important bearing on many other cases needing adjustment, among which is the irreducible minimum royalty clause in some leases, if transportation is to continue as capricious during the remainder of the year. During times when coal is in such heavy demand it would not seem that a minimum royalty would come up for consideration. But mines cannot long work from one to two days a week without feeling it seriously, not to mention the feeling of unrest among the miners.

The Fireman's Dream

Written expressly for "Coal Age"

By BERTON BRALEY

THE fireman slept and he dreamed a dream
Of going down where the hell-fires gleam
And the Devil said, when he met him there,
"Aha, my friend, you may now prepare
For a job to last through eternity
So just step lively and follow me."

HE SEIZED the fireman and rushed pell-mell
Down to the nethermost depths of hell,
Till he and his quaking captive came
To a pit that was full of smoke and flame;
And there, on a bed of glowing coals
Was a hopping, skipping band of souls,
Whose forms would bend and whose backs would crouch
As they picked the coals and bellowed "ouch,"
Blew on their fingers a bit and then
Went back to picking coals again.



He thinks of
that bed of
coals



"These are the firemen,"
said the devil

"THESE," said the devil, "are firemen who
Were wasting fuel their whole lives through,
But here in Hades we kept account
Of every ounce of the whole amount
That went unutilized up the stack
Or mixed with ashes; and now that pack
Of careless spirits must snatch each bit
Of coal they wasted from out the pit.
Each lump or morsel or tiny grain
Whose heat was lost or was used in vain,
Must be extracted by wasteful souls
From the very heart of this bed of coals."

"SO NOW get busy," the devil said.
The fireman blinked at the fire so red,
But the first live coal that he reached to take
Stung him suddenly wide awake;
And he gave a yell as he left the spot
Where his hand had fondled a steam-pipe hot.
But whenever he looks in the boiler's glare
He thinks of that bed of coals down there
And his boss notes a fuel-saving clear
Of a couple of hundred bucks per year!

Economy in Power for the Mine

By C. M. GARLAND

Chicago, Ill.

UNTIL within the last few years the question of economy in power for the coal mine was, comparatively speaking, a question which had scarcely been considered. The attitude of the coal operator was to a certain extent justified in this respect, for with coal having a value of \$1 a ton or under at the mine an investment in costly but efficient power equipment would hardly be warranted.

The result was that the operator, as a rule, bought the cheapest equipment obtainable. He could better have afforded to install equipment that would require 50 per cent. more coal to operate than highly efficient equipment, but he could not afford to install any equipment and operate it in such a manner that from two to five times as much coal was used as was actually required. This poor efficiency has resulted disastrously in more cases than one. There were in the past, undoubtedly, numerous mines that would have shown dividends instead of deficits if the power end of their operation had been properly handled.

Now that coal has reached a value of \$2 a ton and upward at the mine, and shows every prospect of remaining at or near this figure, there can be no further justification for poor economy in power generation. In discussing this matter with the operators, the usual justification for poor economy is given as poor labor conditions. While the labor has something to do with the matter, it might be well to refer to Frederick W. Taylor's pioneer work on efficiency in industrial operation, in which he has pointed out that for an industrial organization of any kind to be efficient it is necessary that the management should know more about the work than the workers themselves.

CAUSE FOR INEFFICIENT POWER GENERATION

Herein to a large extent lies the cause for the inefficient power generation at the mine. The trouble is not so much in the labor as it is in the management. As a rule, firemen or engineers around the coal mines are on a par with the firemen or engineers around the average industrial plant. The real problem is to convince the management that a half dozen or more small hand-fired boilers connected up to a half mile or more of bare steam pipe is not an economical installation, or that a system of maintenance which permits repairs only when equipment has broken down and nothing more can be obtained from it is ruinous. "A stitch in time saves nine" is literally true in power-plant operation.

At the present time the use of central station power is becoming quite common, and properly so. The question as to whether it is more economical to purchase or to generate power is, however, a particularly complicated one for the mine plant. There are five elements entering into the problem which must receive consideration. The nature and magnitude of the load, cost and reliability of the purchased power, the status of the power equipment installed at the mine, the value of the coal and the amount of heating to be done in winter.

If the plant is a new one from the ground up, and the

load is small or medium, it is probable that it will be more economical to purchase power and install the equipment accordingly. If, on the other hand, the plant is new and the load is sufficiently large, it may be more economical to generate power.

If an existing plant is being considered and the load is medium or large and the power-generating equipment installed is in fair condition, it is probable that by making suitable alterations it will be more economical to generate power. It is not possible, however, to make rules covering plants in general. Each plant is a problem in itself and must receive individual consideration.

In addition to the five principal points enumerated above, there are numerous minor details which may be combined to throw the decision either way. The following is a typical example: The plant consisted of an engine and boiler room adjoining. The boiler room contained twelve 72 in. by 18 ft. return-tubular hand-fired boilers and three, direct-acting steam pumps. Boiler settings were all in poor condition, the piping was without covering and numerous leaks around the flanges were discharging steam into the room. The water was bad and the boilers and pipe lines were filled with mud and scale. The engine room contained one 100-kw., one 200-kw. and one 300-kw., 250-volt, direct-current, high-speed engine generator, noncondensing.

In addition to the foregoing units there was a 24 x 36-in. hoisting engine. Outside of the engine room and located at a distance of from 50 to 500 ft. from the boiler room the following small engines were located: Three car puller engines, one sand dryer engine, three engines for conveyors, one fan engine, four small steam pumps, two engines for the repair shops and one shaker screen engine.

These engines were all connected up with piping ranging in size from 1 to 4 in. and having a total length of approximately 2000 ft. No covering was used and the lines were drained by bleeding into the atmosphere. The steam generated in the plant during a working period of 7½ hours was distributed approximately as follows:

	Lb. per Hour
Hoisting engine.....	18,000
Condensation in pipe lines.....	1,200
Leakage.....	1,200
Small engines and pumps.....	14,000
Engine generators.....	20,000
Total.....	54,400
Total for 7½ hours.....	408,000

During the nonworking period of 16½ hours, the following steam was used:

	Lb.
Condensation in lines.....	1,200
Leakage.....	2,000
Engine generator.....	5,400
Hoisting engine.....	6,000
Fan.....	1,500
Pumps.....	1,500
Total steam per hour.....	17,600
Total steam for 24 hours.....	698,000

Evaporation of steam per pound of coal was approximately 5 lb. About sixty-nine and eight-tenths tons of

coal were used per day and the annual coal bill was \$44,400, of which no record was kept. Coal has a value of approximately \$2 per ton under present conditions. The annual cost of power was as follows:

Coal	\$44,400
Labor	21,600
Repairs	4,500
Oil and supplies	2,500
Total	\$73,000

The following changes were recommended: Replacement of small engines with motors; the installation of a 750-kw. mixed-flow turbine with regenerator and condenser to operate on the exhaust from the hoisting engine; the replacement of the small boilers with three 400-hp. units equipped with mechanical stokers. If these changes were made the old engine-generator units would serve as emergency equipment while the steam turbine would normally carry the load. The electrical load, which formerly averaged 400 kw. per hour during the working period, would now average 550 kw. per hour. All of the small engines would be discarded.

CHANGES BROUGHT ABOUT LARGE SAVING

After the changes are made the following is the estimated steam consumption:

	Lb. per Hour
Hoisting engine	18,000
High pressure steam for turbine	7,370
High pressure steam for auxiliaries	4,500
Total	29,870
Radiation and leakage	787
Grand total	30,657

The steam required for the nonworking period of 16½ hours is as follows:

	Lb.
Hoisting engine	3,000
Auxiliaries	3,600
Generator	5,000
Total	11,600

The coal consumption for the 24-hour period is 32½ tons and the annual coal bill is \$21,640. Under these conditions the annual cost of power would be as follows:

Coal	\$21,640
Labor	10,600
Repairs	2,500
Supplies	1,500
Total	\$36,240

The total investment required for the foregoing changes, including the overhauling of hoisting engine and engines and generators, would be \$101,000. The fixed charges on this investment at 12½ per cent. would be \$12,620. The annual cost of power is therefore \$48,860 and the annual saving over the cost of power before the making of the changes \$24,140.

The question next to arise is that of purchased power. In the event that power is purchased the hoisting engines will be discarded and an electric hoist installed. The total investment necessary is \$52,000, and the fixed charges at 12½ per cent. are \$6500 per annum.

With purchased power the average load for the working period is 775 kw. and for the nonworking period 120 kw. The power companies' rate for this load was 1.7c. per kw.-hr. The total estimated kilowatt-hour consumption per annum was 2,329,000, making the bill for current \$39,500 yearly. The annual cost of power is estimated as follows:

Current	\$39,500
Labor	6,000
Coal (for heating)	1,400
Repairs	1,500
Supplies	1,000
Total operating cost	\$49,400
Fixed charges	6,500

Annual cost of power \$55,900
The saving in generated power over purchased power is \$7,040.

A plant of this size would be classed as medium. Owing to the comparatively high figure of 1.7c. for the cost of current, it would be more economical to generate power with the improved equipment. In addition to this saving the item of spare equipment which makes shutdowns due to failure of the power equipment almost impossible, there is an additional item of saving which cannot well be estimated.

If the cost of current had been 1.5c. per kw., which would have been a more reasonable figure for the amount of current required, and if there had been no heating requirements, the cost of generated power and purchased power would have been approximately the same. The selection then should have been made on the basis of the reliability of the service.

If in the example above the amount of power required per annum had been from 25 to 50 per cent. greater, this additional power would be generated at approximately the cost of coal. There would then be little chance for purchased power even at the lower rate of 1.5c. per kw.-hr. Conversely, if the amount of power required had been from 25 to 50 per cent. under the actual demand, there would have been no economy in generating as the fixed charges and labor item would remain essentially the same.

Referring again to the original coal bill of \$44,400, which was based on coal at \$2 per ton, it will be noted that if the price of coal had been \$1 per ton that the cost of power under these wasteful conditions would have been \$50,800 per annum. This compares favorably with \$48,860 as the cost of power generated with improved equipment and with purchased power at \$55,900.

It will be noted also that the large saving effected by the improved equipment is not alone due to the decreased fuel consumption. The labor item about which there is so much complaint, which to a large extent is justified, is excessive and would never be tolerated in the average industrial installation. Small hand-fired boilers together with the large number of small engines makes an excessively large labor item, which can be reduced readily by anything like modern generating equipment.

Correction

In the explanation of the use of the diagram (Fig. 3) for finding the change in declination of the sun, in the article on "The Ross Meridiograph," in the last issue of *Coal Age*, a misstatement is made in the third paragraph on page 734. The last lines in this paragraph should read as follows: *Then, project this last point vertically onto the scale at the top or bottom of the diagram, as the case may be.*

Likewise, in the seventh line from the bottom of the same column, the words "whose intersection with" should read *and that point again projected vertically onto.* Also, the words, *corrected for refraction and declination* should be inserted after the words "sun at noon," in the last line, second paragraph, second column, page 732.

Fuel Mixing Plant at Hazleton, Penn.

An article appeared in the Mar. 9, issue of *Coal Age* on the "Utilization of Anthracite Culm," by M. S. Hachita, who describes a number of interesting experiments conducted by the Lehigh Valley Coal Co. on various mixtures of anthracite culm and bituminous coal. This matter has attracted so much attention that further information about the plant itself might be timely. Also the latest developments in the situation.

The utilization of hitherto practically waste fuel products, conveniently stored for use, serves various purposes: It is quickly available in considerable quantity, it releases other fuel which is in great demand, and valuable space around some breakers is not stored with what was previously an ever-increasing pile of culm.

Lehigh Valley Coal Co. in the Clearfield region of Pennsylvania, is dumped into the boot of the elevator A, from which it is elevated to the top of the structure. At the upper end of this conveyor line the coal passes over bars—the fine coal falling through goes direct to the bin G and the lumps are carried on to the rolls, which crush to about 1 in. The rolls have little work to perform, as the coal coming from the Snow Shoe mines is screened through 1½-in. bars. The bin G has a capacity of about 85 tons. The culm bin F holds about 50 tons.

Coal feeds by gravity from the bins to the revolving tables *C* and *D*; the former has a peripheral speed of about 2½ ft. per min. and the table *D* of about 5 ft. per min. (See diagram below for details of these tables.) This arrangement tends to feed one volume of silt to two of bituminous coal to the mixing table *E*. A strip of sheet iron (12 in. wide) around the outer edge of the revolving table, but not attached to the table, keeps the

tons of coal a day on its engines—no small item. The present Hazleton mixing plant coals the locomotives on the Mahanoy & Hazleton division and also to Coxton. When the plant is enlarged to twice its capacity, the excess fuel will coal engines running to Lehigh and also to Wilkes-Barre. On the mountain divisions a mixture of one part culm to two parts bituminous coal is required, but for yard service a 50-50 mixture answers and saves money.

The Hazleton plant has proved to be such a success that another and larger mixing plant is well under way at Coxton. Part of the material for this new plant is on the ground and construction should proceed rapidly with good building weather. With the addition of the Coxton plant, the coaling service should extend to Manchester. It is expected that the new plant will use annually 250,000 tons of culm, which will come from the following collieries: Dorrance, Franklin, Mineral Spring, Exeter, Seneca and Heidleburg. These mines are operated by the Lehigh Valley Coal Co. and produce about 250,000 tons of culm a year, which will be used as made. If this supply from the Wilkes-Barre mines does not fill the requirements, then collieries of the Lehigh Valley company in other regions of the anthracite field will make up the deficiency. When new culm is used it will be necessary to filter it in centrifugal machines to remove the excess water.

It is safe to predict that collieries which have used this culm for filling old mine workings to support the top will likely store it for future use. At some of the collieries of the Lehigh Valley Coal Co. the slate or breaker refuse has been reduced to $\frac{1}{4}$ to $\frac{1}{2}$ in. in size and flushed into their mines.

Drill Mounting for Drilling Coal

BY B. B. BREWSTER

The use of the Sullivan rotator or other types of hand-feed, automatically rotated hammer drills has made much headway in the past year or two, for drilling shot holes in the coal face, when blasting is required after undercutting.

As a substitute for hand drilling, the rotator, driven by compressed air and weighing only 38 lb., is many times faster and is perfectly convenient to handle.

While the rotator, in coal drilling, is readily operated by one man, even on deep holes, a drilling gang frequently comprises two men. This is simply to provide for greater speed in handling the drill, steel, hose, etc., and in carrying them from room to room. In coal of ordinary height (6 ft. or less), and for holes of ordinary depth, the operator, either alone or with a helper, has no trouble in supporting the drill by hand. For deep holes or high coal, some form of simple mounting has been found desirable.

The accompanying illustration shows such a mounting, devised by the writer for this purpose, and used with success in at least two Utah coal mines. This consists of two rear legs or feet, joined at the top by a cross bar, having a tee in the center, in which is secured a horizontal bar or leg. The rear legs have a telescoping joint formed by drilling holes at regular intervals in the pipes, of two diameters, composing the leg and a pin inserted to hold the leg at the height desired.

This mounting is made of ordinary pipe, 1 in. or $1\frac{1}{2}$ in. in diameter, and fittings. It is set at the height desired, and the drill is hung under the horizontal bar or leg on two hooks, one on the drill handle, the other at the bit end of the steel. This makes it unnecessary to hold the steel while collaring the hole. The operator merely steadies the machine and thrusts it forward to its work.

In the setting shown, holes were put in about 6 $\frac{1}{2}$ ft. above the floor, in 8-ft. coal, and the drilling was done rapidly and easily. In this mine, where the coal was fairly hard, miners with hand augers drilled about 10 holes per man per shift, the holes being 5 to 5 $\frac{1}{2}$ ft. deep. It required two, four or even sometimes six hours to drill the holes for a single room.

In trying out the new mounting, several rooms were drilled. One of these will serve as an example of the



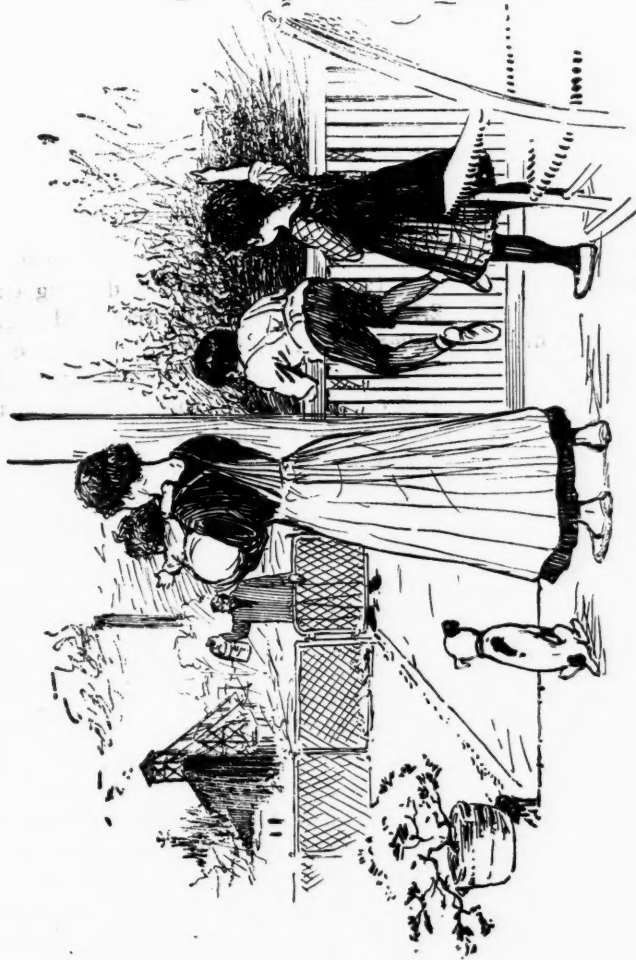
SIMPLE DRILL MOUNTING FOR DRILLING COAL

results secured. Five holes were drilled, or a total of 27.1 ft., in 13 min. 10 sec. drilling time, an average of 2.1 ft. per min. The drill and mounting were then pulled down, moved to a near-by crosscut, reset, and three holes drilled, or a total of 16.3 ft., in a total time of 17 min. The actual drilling time on these three holes was 8 min. 2 sec. The drill used was $\frac{3}{4}$ -in. hollow hexagon steel and "Z" bit. On the first hole two lengths of steel were used; on all others, one 6-ft. length only. The great time and labor economy of such a coal-drilling rig will at once be evident.—*Mine and Quarry*.

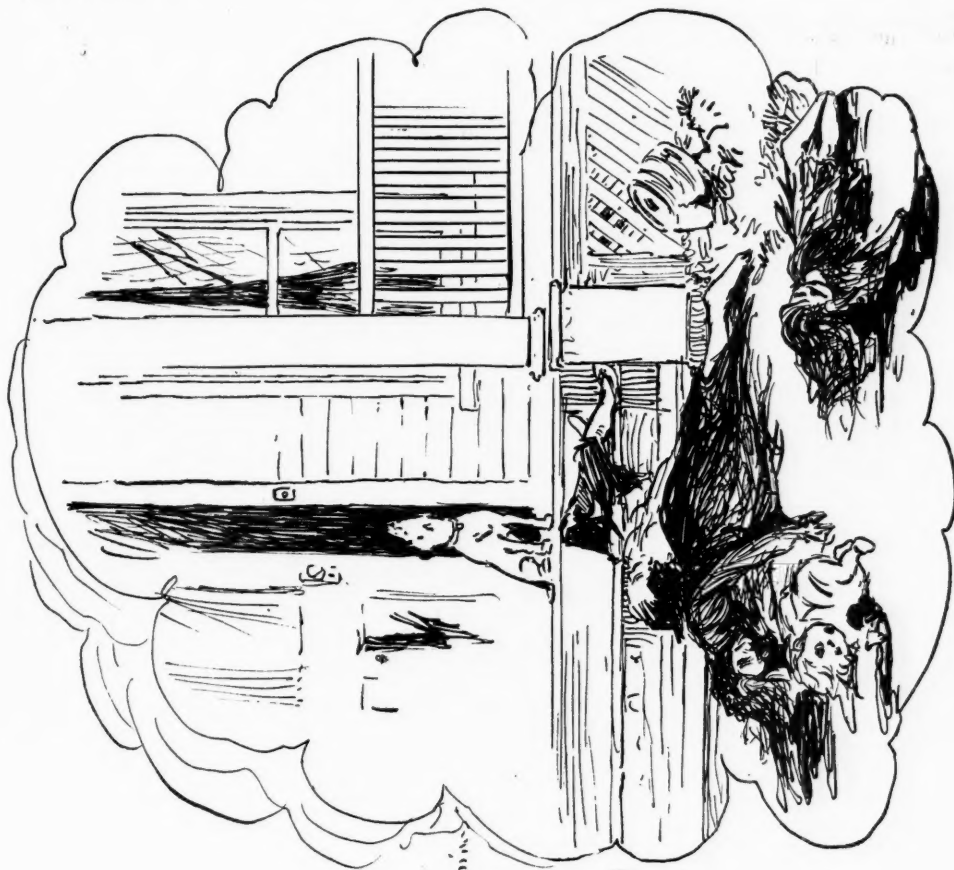
New Coal Mining Paper

A new coal mining paper, to be known as the *American Coal Miner*, has been started by K. C. Adams, formerly in charge of publicity for the United Mine Workers of America. The new publication will be a weekly digest of coal mining news, summarizing and briefing the best articles appearing in other coal mining papers. Mr. Adams is editor of the new paper, and he states that it will be a high grade publication throughout. It will doubtless be received with a great deal of interest by the industry.

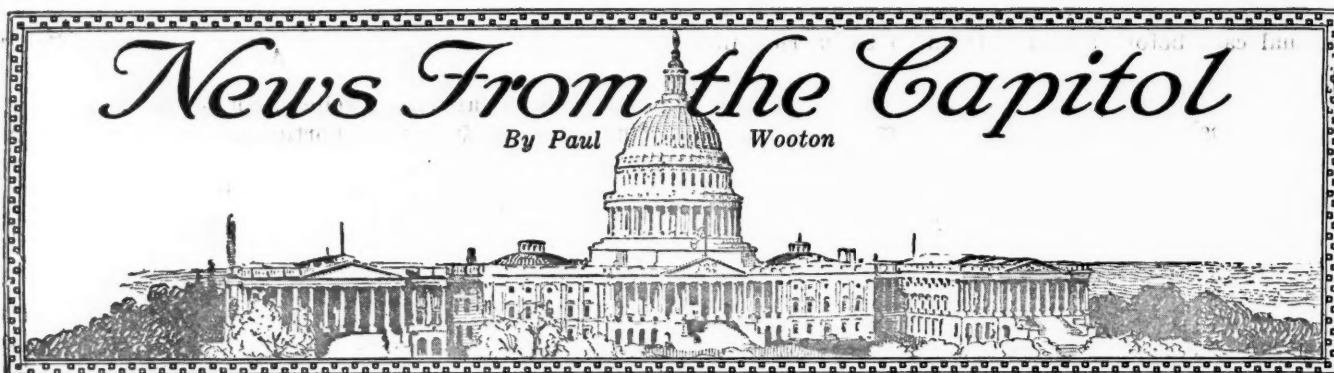
Which?



Will you lend your money to
fight the foe "Over There," or
will you wait till they come
"Over Here" before you are
sufficiently aroused?



Buy
Liberty Bonds
Now!



New Coal Prices

New coal prices in the States of West Virginia, Kentucky, Missouri and Kansas, effective Apr. 20, were announced by the Fuel Administration last week as follows:

State or Field	Run-of-Mine	Prepared Sizes	Slack or Screenings
West Virginia:			
No. 10 district, Coal & Coke and Gauley districts; Taylor, Barbour, Lewis, Buckhannon, Randolph, Gilmer, Braxton, Webster and Greenbrier Counties; operations in Nicholas County east of the mouth of the Meadow branch of the Gauley River and Coal & Coke district in Kanawha and Clay Counties, north of Charleston.....	\$2.30	\$2.55	\$2.05
Fairmont district; Monongalia, Marion and Harrison Counties.....	2.15	2.40	1.90
Thacker district, operations in McDowell County west of Panther on the Norfolk & Western and in Mingo County west along the Tug Fork of the Big Sandy River to Williamson on the Norfolk & Western.....	2.30	2.55	2.05
New River district; Fayette County south of Hawk's Nest on the Chesapeake & Ohio, Fayette and Raleigh Counties south of Paintsville on the Virginian R.R., Wyoming County north of Herndon on the Virginian Railroad.....	2.35	2.60	2.10
Logan district; Logan County and operations in Boone County south of Danville on the Chesapeake & Ohio, Lincoln County south of Gill on the Chesapeake & Ohio.....	2.15 2.50	2.40 2.75	1.90 2.25
Putnam County.....			
Kenova district; operations on the watershed of the Tug Fork of the Big Sandy River west of Williamson on the Norfolk & Western and Wayne County.....	2.30	2.55	2.05
Kanawha district; Nicholas County west of the mouth of Meadow creek, Fayette County, west of Hawk's Nest and north of Paintsville and operations in Raleigh and Boone Counties on the watershed of the Clear Fork branch of Coal River, Boone County, north of Danville, Kanawha County south of Charleston and Lincoln County north of Gill.....	2.25	2.50	2.00
Kentucky:			
Thacker district; operations in Pike County on the watershed of the Tug Fork of the Big Sandy River east of Williamson.....	2.30	2.55	2.05
Kenova district; operations in Pike County and in Martin County on the watershed of the Tug Fork of the Big Sandy River west of Williamson.....	2.30	2.55	2.05
Missouri:			
District No. 1; Audrain, Bates, Calloway, Henry, Johnson, Monroe, Randolph, Ralls, St. Clair, Schuyler, Vernon, Montgomery and Adair Counties, except operations of the Star Coal Co. and operation in Macon County east of New Cambria and mining operations not covered by other rulings.....	2.70	2.95	2.45
District No. 2; Boone, Clay, Cooper, Chariton, Carroll, Dade, Harrison, Linn, Lafayette, Putnam, Ray and Sullivan Counties and Macon County west of New Cambria and the long wall thin-seam mines in Randolph County.....	3.15	3.40	2.45
Brandy County; operations of the Star Coal Co. in Adair County; shaft workings on the upper thin vein in Barton, Bates and Vernon Counties.....	3.65 3.40	3.95 3.65	2.45 2.45
Watt County.....			
Kansas:			
Cherokee and Crawford Counties, except shaft mines on the upper thin vein and any mining operations in the State not covered by other rulings.....	2.70	2.95	2.45
Shaft workings on the upper thin vein in Cherokee and Crawford Counties.....	3.65	3.95	2.45
Osage, Franklin and Linn Counties.....	3.50	4.50	2.80
Leavenworth County.....	3.40	3.65	2.90

The foregoing prices do not include the allowance of 45c. a ton to those operators who have complied with the Washington wage agreement.

Weekly Production Statistics

Bituminous coal production during the week ended Apr. 13 was 10,947,000 tons, an increase of nearly 18 per cent. over the preceding week. Anthracite forwardings were 37,760 cars during the week ended Apr. 13, an increase of nearly 6000 cars over the week ended Apr. 6. Beehive coke production for the week ended Apr. 13 aggregated 672,000 tons, an increase of 50,000 tons over the week preceding. Byproduct coke production for the week ended Apr. 13 was 469,561 tons, a very slight increase over the week preceding. The figures are estimates made by C. E. Leshner, the geologist in charge of coal statistics for the Geological Survey. Telegraphic advices to the Fuel Administration covering bituminous coal production during the week ended Apr. 20 indicate that a still further increase in production has been made.

An increase of 744,000 tons of bituminous coal over the production of the first three months of 1917 was attained in January, February and March of this year, Mr. Leshner estimates. This is equivalent to an increase of one-half of 1 per cent. over the corresponding period of 1917, but is slightly less than the coal mined during the first three months of 1916. March production, however, was greater in 1918 than in either 1917 or 1918.

Railroad Fuel Situation Not Yet Settled

While the railroad fuel situation, at this writing, is by no means settled, the advantage in the controversy has turned sharply to Dr. Garfield, the Fuel Administrator. In the hope of devising some means whereby the deadlock may be broken, Dr. Garfield has laid the entire matter before the Board of Directors of the National Coal Association. The advisability of making any concessions in an effort to do away with the present uncertainty is being discussed. If the amount of the concession from the price schedule could be turned directly into the treasury of the United States, it would come nearer meeting the approval of the Fuel Administration, it is understood.

The stumbling block in the whole negotiations has been John Skelton Williams, the director of purchases for the Railroad Administration. It is known that the President has the utmost confidence in Dr. Garfield's judgment. In the discussion of the railroad fuel situation with the President, it is said to have developed that the President has been embarrassed on a previous occasion when the advice of Mr. Williams was followed and, as a result, it is considered logical that he will

scrutinize any of Mr. Williams' recommendations with unusual care before allowing them to be carried into effect. The controversy already has interfered with production and distribution of coal to such an extent that it is believed a settlement of some sort must be reached promptly.

Retail Prices To Be Equalized

Retail prices of coal are to be made as near uniform as possible. To accomplish this end, the following message has been sent by the Fuel Administration to all its county chairmen: "No doubt the most perplexing problem confronting you and your committees has been the great variation between the costs of the different retailers in a given community. Some committees have not realized that the high cost of the inefficient retailers were abnormal costs; and they have so fixed the gross margins that even the dealer with the highest costs realized a substantial net profit. By regulation of retail prices and practices the Fuel Administration can encourage efficiency in handling and delivering coal."

Comparatively Few Licenses Requested

Fuel Administration officials apparently overestimated the number of licenses which would be asked in connection with the zoning plan. Instead of the flood of applications expected, comparatively few have been received. Information reaching the Fuel Administration shows that thousands of industries, which previously have been using coal from other zones, are placing orders and receiving their coal in the zone in which they are located.

In some cases, however, the Fuel Administration has learned that consumers are withholding their orders in the expectation that the zone of distribution may be altered in a way that will broaden their sources of supply. Such a policy is likely to prove unwise as the greater portion of modifications are certain to be in the direction of further restriction rather than enlarging sources of supply.

Domestic Consumers Must Fill Forms

Retail coal dealers in New Jersey are demanding from each applicant for coal for domestic use a signed statement as to the amount of coal in his possession and such other information as is required by the form reproduced herewith.

Name of dealer.....
City.....State.....

In accordance with the order of the State Fuel Administrator in New Jersey, purchasers are required to make true declaration in answer to the following questions:

1. Amount and size of coal desired.....
2. To heat.....rooms (not including bathrooms, pantries, etc.).
3. Size used last year.....
4. Approximate amount used last year.....size.....
5. Coal on hand at present.....tons.....size.....
6. Will last approximately.....days.
7. Have you any unfilled orders with other dealers.....

I hereby certify that the above report is true to the best of my knowledge and belief.

Name.....
Address.....

Coal Brasses To Be Utilized in Making Sulphuric Acid

Coal brasses are being relied upon in estimates now being made to furnish a portion of the iron pyrites needed in the making of sulphuric acid. No less than 500,000 tons of coal brasses are available for this purpose, according to the Committee on Mineral Imports and Exports. While few coal companies are in a position to recover pyrites from this material, plans are now being worked out for the establishment of a number of central plants which will turn out the treated product. Efforts in this direction in the past have been looked into and found not to have been scientific, or to have been followed determinedly.

New Maximum Coke Prices

Smelting or furnace coke in Colorado may be sold at \$8.50, according to a ruling by the Fuel Administration. Seventy-two-hour selected foundry may sell for \$9.50.

Prices in Monongalia County, West Virginia, are \$6.25 for blast-furnace grade and \$7.25 for 72-hour selected foundry.

The price for 72-hour selected foundry made by the Empire Coal Co., at Empire, Ala., is \$8.75.

No revision of prices for any district or field will be considered for at least ninety days after the date upon which a revision of prices for the field in question had been announced, a Fuel Administration order sets forth.



MAKE YOUR MONEY FIGHT. BUY LIBERTY BONDS.

THE LABOR SITUATION

EDITED BY R. DAWSON HALL

General Labor Review

There are several items of more than ordinary interest—a settlement in Alabama, the promise of the Tennessee Coal, Iron and Railway Co. that it would enter into contractual relations with its men as have other Alabama operators, the decision of the central Pennsylvania mine workers to be content with their wages, the announcement by President Hayes that it was low-price railroad coal that worried him and not the alleged price tinkering of the Fuel Administration and the decision of the United Mine Workers to issue their journal semi-monthly and distribute it gratis to all members.

The anthracite mines are working well despite threats of strikes against Liberty-bond slackers. There have been, however, a few actual button strikes and a few mines closed down by flooding. Just recently there has been a gain in the mine forces, but the draft may well upset this favorable circumstance. Besides the gain is not in the coal getters. Miners in the anthracite region increased from Sept. 17 of last year to Feb. 13 of this year by 618, but miners' laborers in the same time decreased by 949. The main increases are in company men who handle the coal after it is mined, at mines and at culm piles, whereas the only really hopeful increase would be in men at the face. A table we publish elsewhere shows that this number has decreased by 331. The anthracite region needs 22,000 more men to be as well staffed as it was before the war started.

ANTIUNION DRIVE HAS SPENT ALL ITS STRENGTH

The drive against the union has reached its limit. Everybody now knows what it amounts to, and the panic is at an end. There are 40 local unions in the secession and, apparently, they are all in District No. 9. The leaders of the secession movement have called a meeting for the day on which this issue of *Coal Age* appears. They are not very sure of themselves and so have not signed their communication to the officers and members of the district, individually, but as a "committee." The notices are carboned in red—a fact somewhat symbolic of the affiliation of their issuers with those who use red as an emblem of their blood-thirsty purpose. President Hayes feels sure that the situation is well in hand.

In central Pennsylvania the delegates from District No. 2 met at their regular rendezvous, Du Bois, on Apr. 22. The policy committee reported to the delegates that the price set upon coal by the United States Fuel Administration did not contemplate or admit of an increase in wages. They recommended that there be no strike but urged that the Fuel Administration investigate wages in the district. In all of this the delegates somewhat ruefully concurred.

EVEN THEIR PATRIOTISM DID NOT SPARE THEM

The Pittsburgh district has its enemy-alien trouble like most other districts. Three Austrian mine workers were drafted before the United States went to war with Austria Hungary. With all loyalty and good will they went to camp. When war was declared with the Dual Monarchy they were compelled to return home. Two other Austrian miners who had volunteered before the draft, returned at the same time.

The mine workers at No. 2 mine of the Pittsburgh Coal Co., at Bishop, Penn., refused to work with these men. Vice-president Robert R. Gibbons of the Pittsburgh district, brought the mine workers' local committee down to see United States District Attorney E. Lowry Humes and he explained that the men were simply obeying military regulations and that the strike would serve no worthy cause. A meeting of the strikers followed. Gibbons warned that

a riot would follow if he condemned the strike, but he took the hazard, and the strike ended after it had lasted a day.

The Maryland strike of which mention was made last week appears to have included all the mines in the Georges Creek and Upper Potomac field with but one exception, the Reilly-Peabody concern which operates the old Jackson workings. This is a New York City company and several weeks ago it had signed an agreement with its men.

About 900 mine workers employed on the Western Maryland R.R. between Shaw and Schell, W. Va., in the Elk Garden field stayed out longer than the other mine workers



AIN'T IT A GRAND AND GLORIOUS FEELING ?

because, according to their own declaration, they were not notified to resume. They returned to work, however, Apr. 18, a day after their fellows in the adjacent fields.

This is the first serious strike the Georges Creek and Upper Potomac field has had for 18 years when, in 1900, William Warner, an organizer for the United Mine Workers, closed the mines for two months.

The Washington agreement not only established a penalty clause, but it put in operation a new schedule of wages. Those who comply with the agreement are allowed to charge 45c. a ton more than before. The union makes the assertion that in many nonunion regions the operators are dutifully adding 45c. to their price and forgetting to add the full increase to the wage paid their employees. The charge is no light one, and if the union can establish the facts by

the organizers they have sent into the nonunion fields they will do the industry no small service. Dr. Garfield has informed President Hayes, of the United Mine Workers of America, that by special investigators he will make careful inquiry of all the abuses of which Mr. Hayes has given him notice. These men will visit the mines and will enforce the provisions of the agreement.

War Reactions in Anthracite Region

The recent actions against enemy aliens in the anthracite region have been more reasonable than those in the past. For a while the mine workers, especially in the Panther Valley region, seemed determined to keep Germans and Austrians from working in the mines. The feeling was only sporadic, and did not seem, even where it appeared, to evidence an all-inclusive exception to all enemy aliens. Still it was menacing for it might have spread to all the mines of the anthracite region and have involved all those whose naturalization was still incomplete.

But no matter how strange and illogical it may seem the feeling existed nevertheless. The public had barely seen the matter settled satisfactorily by the exertions of the labor-union leaders, when it read in the papers that German prisoners in France were being compelled to work by American soldiers. It is the old story. Nobody seems to know what to do about the alien. He is damned if he does and he is damned if he doesn't. Today he must be compelled to work, tomorrow he must be forbidden; now he must be naturalized—this if he is not an enemy alien—then again he mustn't be allowed to accept naturalization.

MORE EXCUSE FOR CENTRAL PENNSYLVANIANS

It must be admitted that there is some possible shadow of justification for the mine workers in central Pennsylvania when they proclaim that they will not let friendly "enemy aliens" share in a car service that is wholly inadequate even to keep native and naturalized citizens busy. The action of these mine workers is perhaps none too kindly when we consider that it denies a living to men who show their goodwill by their readiness to work, and often by their buying of Liberty Bonds and by their attempts to become soldiers in the United States army. In fact, unreasoning bitterness to them will not engender in them that spirit of Americanism which we want newly arrived Americans to share with us.

But the objections formerly raised to friendly "enemy aliens" in the anthracite region was more inexcusable, because men are scarce in that region and every man, native or foreign, has work every day. Some men are even complaining that the companies are insatiable in their demands on the workers for more coal and more shifts of labor.

However, as said, the refusal to let men work when they will not buy Liberty Bonds rests on a far better basis. All men whom America is aiding should do their part in return by subscribing to the Liberty Loan.

MUST BUY LIBERTY BONDS OR LEAVE THE JOB

At the Sandy Run mine, near Freeland, the mine workers have served notice that they will refuse to work with three pro-Germans who have refused to buy Liberty Bonds. A Hungarian and an Italian were discharged Apr. 18 from the Harleigh strippings of the Central Pennsylvania Strip-ping, Quarrying and Construction Co. because they made a similar refusal. Their fellow workers threatened to strike if these slackers were permitted to work, and for a while it appeared that a lynching was in prospect.

At the Lytle colliery five Austrians who refused to purchase Liberty Bonds were taken by the heels by the workmen and dipped into a steel tank where oil is heated for the colliery engines. The men are covered with an amber stain that will not easily be washed out. When they threatened suit against the ringleaders they were told that any such action would result in their being strung up. As a result on Apr. 18 all five men purchased Liberty Bonds, and decided to make no trouble for those who had been guilty of hazing them.

At Last, Alabama Wage Is Settled

On Saturday, Apr. 21, the wage scale of the Alabama region was settled after a long delay. It will be recalled that on Dec. 14, 1917, the Fuel Administration made certain recommendations to the mine workers and operators relative to an adjustment of working conditions in the Alabama coal field. In this document under section 7 it was provided that the readjustment of mining rates and wages be postponed until July 1, 1918.

However, the representatives of the Alabama coal operators and those of the mine workers in Alabama expressed a desire for an earlier adjustment and conferred with the Fuel Administration to that end, and in consequence it was decided that the following rates and wages should become effective May 15, 1918, and continue in effect and binding during the continuance of the war, but not longer than for two years from Apr. 1, 1918, should the war be protracted for a longer period of time.

NEW DAY-WAGE AND TONNAGE SCALE PROVIDED

Under the scale day labor will be paid as follows: Drivers, \$3.44 per day; unclassified inside day labor, \$3.20; unclassified outside day labor, \$2.75; tippie men, \$3.00; miners employed by the day, \$3.84; trappers and other boys, 50c. per day advance.

All other classes of day labor employed in and around the mines to be advanced 75c. per day over present prices. But in no instance shall the rate paid exceed that paid for the same class of labor in the Tennessee and Kentucky scale which was approved by the Fuel Administrator Nov. 7, 1917. It is understood, however, that where day labor is now paid more than the Tennessee and Kentucky scale no reduction shall take place.

The pick-mining rate for run-of-mine coal is advanced 5c. per ton. The machine-coal loaders are to receive 4c. more per ton. Machine runners and helpers where employed by the day, ton or foot are to be advanced 10 per cent. Compensation for all yardage, room turning and dead work is to be increased 6¼ per cent. Miners when taken from the face to do company work shall receive the rate paid for that classification, but, in no instance, shall the rate be less than the rate paid for miners when employed by the day.

HOUSE-COAL PRICE IS INCREASED TO MINERS

Each operator affected by this agreement shall file with the umpire within two weeks after its formation (sic?) the scale of wages paid at each mine during March, 1918, for mining, yardage and dead work and day labor, also the scale of wages paid for the same work under this agreement. House coal shall be advanced 45c. per ton.

If any mine worker or group of mine workers in any way interrupt the operation of the mine or causes a strike, the operator shall deduct from the earnings of each employee, except those who continue at work, the sum of \$1 per day for each day or fraction thereof that such mine worker fails to report for work.

If any mine is closed or the men locked out by an operator, without just cause, the umpire of the Alabama district will impose upon and collect from such operator the fine at the rate of \$1 per day for each mine worker affected. All questions arising under the foregoing provisions are subject to review by the umpire of the Alabama district. All fines collected shall be paid to the American Red Cross. It is not the intention of this penalty clause that it shall apply to individuals who may temporarily absent themselves from work, but it is intended to insure maximum coal production and to compel operators and miners to submit their complaints to the proper tribunal for adjustment without strike or lockout. Any operator failing to collect the penalty as provided herein shall be penalized one dollar per day per man affected.

This agreement is signed by Rembrandt Peale and John P. White on behalf of the Fuel Administration and by G. B. McCormack and J. H. Bankhead on behalf of those operators who agreed to the recommendations dated Dec. 14, 1917, and by J. R. Kennamer, William Harrison and Adam Wilkinson on behalf of the Alabama Mine Workers.

EDITORIALS

To Have and To Hold

THERE is a little advantage in talking thrift to anyone. Probably no one ever saved because he was urged to save, at least not for long. Thrift is one of the negative virtues. There are no thrifty people. There *are* people, however, who like to spend. Even the miser does not really enjoy saving, but he puts away his pennies to *buy* gold so that he can gloat over it.

Most people are not satisfied with gold; for they need something less like money; but a bond or a war-saving stamp will satisfy their buying propensity. They will buy a bond, but they will not save the money which would purchase it. Any man with this objective can be turned into what looks like a thrifty man. He is not so much a self-denying fellow, however, as an acquisitive one. It is no good to tell him to save; tell him to buy a bond. He is approachable on a buying line, and on that only.

A spendthrift is a man who squanders his money on perishable things; a thrifty man is one who expends his money on less perishable things. Both are spenders; both are actuated by the desire to spend. All of them will buy a Liberty Bond, for all have the desire to purchase something, and there is no investment that is better than this one; for it brings a profit both to the buyer and to the nation.

Why This Is the Worker's Paradise

IT WAS generally conceded not so many years ago that nowhere in the world did the workingman have more comforts and privileges than in the United States. Of recent years, as a result of an assiduous campaign, a doubt has come into some minds. Germany, where the workman has been face to face with the most grinding poverty, has woven a spider web across the chasm of disaster to catch the workman when he fell. As shown editorially last week, the webs are too thin to do anything but mock the faller with their substanceless unreality. Yet Germany, we have been told, has a better civic life than we have.

It has been quite generally the opinion of our workingmen that wages were better than welfare provisions; that it was better to put money in a man's pocket and let him use his freeborn judgment on it than to dole it out to him and spend it for him. Perhaps that is not the correct view. But, at least, nations that give pensions and protection of various kinds must take that gift from wages, and it is quite clear that wages, pensions and other protection are alike inadequate in Germany, as we Americans rate adequacy.

The workingmen of America are fortunate in living in a country where the raw materials are in abundance and readily accessible, where the coal outcrops at the surface, where iron can be dug by steam shovel, where large cliffs of limestone are found, where the hills have

been clothed with magnificent forests, where the oil springs from the ground as water alone rises in many countries, where the soil has, at least till recently, been unexhausted, and where there has always been room for expansion because the country is not nearly so close to its limit of population density as are other countries. Nevertheless, in comparing the United States and Germany, it must always be remembered that next to the United States there is no country so well favored as Germany in its natural resources.

Almost as important, however, as natural resources is the spirit of the workingman. There is no workman like the American. No one can avoid the impression that it is his genius and readiness for production that have made possible that large output which has been so liberally divided among American workingmen. His capacity for production is unexcelled. In no country has he obtained a larger percentage of the product of his labor; in none has the product been greater. No wonder his lot has been enviable.

In only a few instances have American workingmen felt that there was a limit to the annual consumption of mankind, and that therefore it was to their interest, to do as little as possible so as to provide the maximum hours of employment for the workingman. They have almost always been willing to do their level best, knowing that cheap goods make a brisk market and so promise as large an annual wage as dear goods and a sluggish market.

They have argued, when they cared to argue, that as their desire for the good things of life was unsatiated and insatiable, so was the desire of other people; and they felt assured therefore that in the long run the public would buy all that the public could and would produce. Work has never been to the eager American workingman a grudgery to be avoided, but a pleasure to be sought. Of course, there are exceptions—some, alas, in the coal industry—but they are not as numerous as in Europe.

A restless race of people, who left Europe because they wanted to progress and dared to try a new country in pursuit of that progress, the American people have always had a surplus of energy; and what they produced with their hands they used to build their homes and to clothe their bodies. What wonder then that the workingman lived in a home like a bourgeois, his good lady dressed like a burgomaster's wife and his children were educated like the sons of merchants. It had to be. They made the wealth, with their two hands and swaying bodies. They won it as by an incantation, and when it was won they could not fail to have it and to use it.

They have preached to us another workingman who would not work so happily—a workingman who gloried in low production. Let us never doubt that such a workman living in a land of low production will have but stunted product for his stunted labor. He will

try to rob his fellowman by half-hearted labor, and his fellowman will try to rob him by pouring water into the milk of his hourly endeavor, and all will starve.

"Product" should be our watchword—not to best the foreigner, but to better ourselves; not to prevent John Bull, Jean Crapaud or Johann Schmidt from serving us with goods that they can more cheaply and more easily produce and which, perhaps, in some instances they alone can produce, but so that we may have the material to buy and the product on which to live lustily and well.

Big Foreign Coal Trade After War is Over

UNDER this title appear some remarks by J. H. Wheelwright on the prospects of extending our coal trade after the war. It is cheering to find that such an undoubted expert looks so favorably on possibilities. It will be noted that the reasons he gives for our past failure to obtain entry into the European markets are those which have been quite generally advanced before. As they are largely superable by good salesmanship, reasonable legislation, favorable treaties and suitable banking facilities, it is heartening to note that Mr. Wheelwright recognizes no other difficulties. Surely, if these be all the hurdles, they can be taken in a run. As the French say, "We have arrived."

Mr. Wheelwright says that the larger death rate of those in European countries will make for greater trade. It is a mournful reason for an extension of commerce, but a mournful syllogism is about as apt to be true as a cheerful one. However, the killing of men never makes for trade. The less people in Europe, the less possibilities of trade there are. Moreover, as the producers of coal have been less generally drafted than the consumers of coal, it may possibly be that they have the higher death rate. That being so, the coal industry in Europe may find itself overstocked with men when the war is over. The importance as an essential product will have proved its buckler.

Credit balances, furthermore, are apt to be unfavorable after the war. The Allies have borrowed five billions of dollars. For their sakes we regret that they are likely to have to borrow much more. Suppose it is ten billions in all that they borrow. Roughly, they will be required to pay back in interest alone half a billion dollars a year, about the amount our Federal Government expended before the war. Anybody can see that debtors such as these will be sellers rather than buyers. They can only become extensive buyers by entering still further into our debt. This they may do for a few months or years after the war ends. But thereafter they will be less ready to purchase.

The future for the foreign coal trade is in South America. The most profitable and extensive trade is with those whose products are different from ours, and South America, being more tropical, furnishes that condition. There is some coal there, perhaps more than we think. Coal is so universal that its alleged absence from any large area argues rather imperfect investigation than anything else. Gradually we are getting to know of resources of coal in South America, but even if they are developed we shall ship coal to that region nevertheless.

Suppose the Argentine has a fine deposit easily available to the sea coast, with a good harbor, sufficient

labor and favorable mining conditions, and it desires to ship to the Amazon region. Will it ship there? Hardly, for there being few people in the section with the coal mines there will be no return cargo, whereas the United States is a ready market for the products of the Amazon region—rubber and coffee and what not. The same is true of the United States of Colombia.

In the countries where the coal cannot be got to the coast readily, or where the coal so far discovered is of little value, we shall find a splendid market. The countries of South America have products which supplement our deficiencies, and ours will supplement theirs. Trade with South America is trade with the unlike and should always be brisk as far as the size of the populations of South America and the energies and resources of those populations will permit.

Capitalizing One's Inefficiency

WITH what effrontery the Government railroads have capitalized their inefficiency! One would think the railroads would be around apologizing to the operator and mine worker for their inability to supply cars. A proper spirit of public responsibility should lead them to go the length and breadth of the coal field, promising that what little service they could give would be rendered without discrimination. They would explain just why the service is slow, but assure the coal industry that the distribution, if inadequate, will always be just.

But this is not the attitude of the new railroad trust. The companies deliberately said to the operator: "We have fallen down on the job, we expect to continue to fall down on it, and we propose to profit by that fact. We will give any operator the cars which belong to his neighbor if he will give us coal at a low price. We have made up our minds that the railroads are not constructed to serve the public but to serve the railroads. We will give our cars only to those who will sell us coal for less than cost."

It is not necessary that we point out to our readers how the railroads could secure all the coal they need just as surely by distributing their orders pro rata among all or a large proportion of the coal mines as by confining their purchases to a few. There has been no need to secure that priority by giving all the cars to certain mines, letting the others go almost entirely unsupplied. By this action all the evils of discrimination in car supply have been renewed, this time under Government auspices.

Worse yet, it is reported even by the friends of the Railroad Administration that the railroads have been turning some of the coal over to munition plants; in what quantity is not known. Thus the inequality has been intensified. The ability of the railroads to ruin business has often been asserted, but its baleful influence was never so arrogantly used as it has been since the control fell into the hands of the Federal Government. However, we take no little pleasure in acknowledging that the railroads have been compelled by the strong hand of our national steersmen to promise a more equitable service to the industry in the future. A fair price is a desideratum, but a fair service is even more important. Surely we may look for this from the Railroad Administration.

DISCUSSION BY READERS

Safety in Shotfiring in Mines

Letter No. 2.—The danger that might arise, in the present war crisis, from the promiscuous handling of high explosives by unauthorized persons, was emphasized strongly by the order issued some time since by Fuel Administrator Garfield, requiring that this class of explosives should only be handled by persons who were licensed.

It is reasonable to suppose that there are working in our mines certain enemy aliens whose animosity would lead them to dangerous acts in retaliation for the attitude of our Government toward their country. It is not difficult to imagine the terrible results that would be caused by persons so disposed, loading out dynamite with their coal. The subject calls for more than passing thought and consideration.

DYNAMITE FOUND IN COAL SHIPMENTS

Since the order requiring the licensing of persons handling high explosives was issued, there have been found quantities of dynamite cartridges in shipments of coal. It is only natural to believe that the explosive was placed in the coal willfully in hopes that it would effect its deadly purpose. We can readily picture to our minds the appalling sight of one of our transports bearing thousands of troops being blown up and brave lives sacrificed without a chance of escape.

It is possible, in the daily performance of work in mines where blasting is performed, that others than those duly authorized would have access to the cartridges of those who have been intrusted to use them. For example, an experienced miner who is a citizen of foreign birth may find it necessary to call for the assistance of his buddy who is an enemy alien. This man is only too glad to avail himself of the opportunity thus offered to get in possession of some of the high explosives used. To avoid such a chance the strictest regulations should be enforced in every mine, limiting the amount of explosives taken into the mine and taking account, at the beginning and close of each shift, of the number of shots fired by each miner.

DRASTIC MEASURES MAY BE NECESSARY

So serious is the aspect as to even warrant the prohibition of the use of high explosives in coal mining, except where specially authorized shotfirers are employed to load and fire all shots after the miners have left the mine, and who are held accountable for the cartridges, caps and fuse given in their charge. Where this is not done, it may be necessary to compel the breaking down of the coal by the use of hydraulic power, wedges and other means formerly employed, so as to eliminate from indiscriminate use anything in the nature of high explosives.

Where high explosives are used at mines, a system of accounting should be employed that would show every particle of explosive issued from the magazine and

enable this amount to be checked with the number of shots fired in the mine. This would require a properly constructed form of blank that would be filled out and signed by the mine foreman each day.

In mines where the work of blasting is performed by shotfirers, the amount of explosives required each shift, in each section of the mine, should be determined by the mine foreman. The shotfirer should then be charged with this amount of explosives, which would be delivered to him. In case the shotfirer finds, in his judgment, that a less amount of explosive is required in any hole, than the amount allowed for by the foreman, he should return the unused balance and receive credit for the same.

One of the difficulties confronting the situation, however, is to get conscientious, law-abiding citizens who are capable of performing the duties of shotfirers, and others to be placed in charge of the magazines, so as to insure a true and accurate account of all explosives used in the mine. The duty of making this selection will naturally devolve upon the operator or mine superintendent, who should feel the responsibility resting on him in this regard and give the matter the attention its importance demands.

West Leisenring, Penn.

R. W. LIGHTBURN.

Gathering Motors

Letter No. 1.—Since the discussion on "Gathering Motors," which I remember took place in *Coal Age* about two years ago, great advance has been made in the improvement of different types of locomotives used in mines for the purpose of gathering cars at the face. At present, this subject is very interesting, on account of the increasing number of new mines that are being opened, and because of the fact that many of the old mines are improving their systems of gathering cars and installing different types of motors on the gathering hauls.

In the last eight or ten years, I have gathered coal with almost every type of motor used, and have observed motors working under widely different conditions. I am convinced that there is no one motor that will suit all of these conditions, which vary in different mines and, frequently, in different sections of the same mine, so as to require motors of different types adapted to meet the different conditions.

One instance that I recall just now and which proved a failure was the employment of the old "crab" type of motor. The conditions under which this machine was working, I described in *Coal Age*, Vol. 10, p. 227. As there stated, the rooms were driven 100 yd. deep, and it required much effort for a man to drag the crab cable back to the face of a room, where he would hook it to a loaded car, which was then pulled out of the room by the crab on the locomotive.

Most mining men know that this type of gathering

motor is only adapted to exceptional conditions where the rooms are driven to the dip and the loaded cars must be hauled from the face of the room to the entry by some mechanical means. Where the rooms are driven level to a great depth, or to the rise of the entry, the crab is liable to prove a failure, as it did in the case just mentioned.

Neither is it possible to use the trolley system in such cases, as this would require the wiring of each room to the face, which would make a costly proposition. Under these conditions, it is better to use what is known as the "cable-and-reel" motor. This is a type of gathering motor equipped with a reel on which is wound a light cable provided with a hook that enables the end of the cable to be attached to the trolley wire on the entry when it is necessary for the motor to be run to the face of a room.

OPERATION OF THE CABLE-AND-REEL MOTOR

The cable unwinds from the reel as the motor advances toward the face, and is again wound on the reel as it returns to the entry. Some motors of this type are provided with a friction clutch whereby the reel is thrown in or out of gear, while others are equipped with a separate motor that operates the reel when required. Where the tracks in the rooms are fishplated, it is seldom necessary to bond the rails.

The cable-and-reel motor is built very low so that it is able to haul coal from rooms that the smallest mule could not enter. This locomotive has the disadvantage that the cable is very apt to be injured when the reel is improperly handled, or by the cable catching in a track tie or other obstacle in its path and being broken or so badly injured that it must be repaired or replaced with a new one. These cable troubles often prove very expensive, in the cost of repairs and the time lost in making them.

I have seen a type of locomotive equipped with both the crab and the cable and reel. By the use of this machine it is possible to gather cars from the faces of rooms driven to the rise or the dip, and to avoid the necessity of the motor entering a room that is driven but a short distance, since it is easier to use the crab at such times. Also, cars can be lowered to the faces of rooms driven on the dip much more quickly by the use of the crab than when the motor is required to enter the room with the car.

A SUCCESSFUL TYPE OF GATHERING MOTOR

By far the most successful type of gathering motor is that known as the "storage-battery locomotive." This type of gathering motor is gaining in favor every day, as mining men learn more of its good features. The power, in this machine, is self-contained, which enables the locomotive to go anywhere where track is laid, without the necessity of stringing wires or bonding rails. The only objection to this type of motor has been the cost of the batteries, but this is not excessive when compared with the expense of wiring and bonding rails required in the use of another type.

I have found that the most successful storage-battery motor is that equipped with a pole for use on main haulage roads where a trolley system is installed. A little reflection will show the benefit to be derived by thus equipping a storage-battery locomotive

with a pole. If operated at all on the main line, the power can be derived from the trolley wire, at which time the storage batteries are "boosting." Also, when standing on the siding, waiting for cars, the storage batteries can be boosted, which will be found a great advantage in the daily operation of this type of motor.

My experience is that when the charge of a storage-battery motor is about half exhausted, the drop is much more rapid in the latter half than the previous half of the shift. By the use of the pole, I have worked a storage-battery motor hard for a full shift, and have been able to maintain almost a full charge on the batteries to the end of the shift, by boosting them from time to time as opportunity offered. In this connection, it should be stated that when a storage-battery motor is equipped with a pole, it is possible to use a short-time battery, which means a great saving in the first cost of the battery. This alone is a feature well worthy of consideration.

In closing, let me say that the success or failure of any system of gathering haulage will depend much on the management of the means employed. Objection has been offered by the miners and their union, because they thought it was an effort, on the part of the company, to reduce the working force by cutting out the drivers employed in gathering coal. However this may be considered, the fact remains and it is my belief that the next five years will see this work performed by motors in all large mines.

MOTORMAN.

Herrin, Ill.

Opening New Mines

Letter No. 2—Reading the letter of J. L. Donahue, *Coal Age*, Mar. 16, p. 516, calls to mind the statement of Francis S. Peabody, which he made on this subject, in January, when called before the Senate Investigating Committee.

As everyone knows, Mr. Peabody is a thoroughly practical and experienced coal man and, to my mind, his remarks at that time corroborate substantially the argument of Mr. Donahue in urging the opening of new coal mines. Following is the question asked by Senator Reed and Mr. Peabody's reply:

Senator Reed—Is it not a fact that if there are good prices assured, that there would be new mines opened up and new companies organized, and is it absolutely essential that this should be done?

Mr. Peabody—It is absolutely essential that we should do so. There were 179 mines that went out of business or were exhausted in 1915. These mines produced approximately 18,000,000 tons of coal. During 1916, which was the best year the industry has ever had, there were 106 mines went out. None of these 106 mines that went out would have done so if they had not been exhausted or unable to continue profitably. Now, something must be done and other mines must take the place of these that went out.

If what Mr. Peabody says is true, that the opening and operating of new mines is an immediate necessity, there should certainly be more coöperation on the part of the railroads. One frequently observes that the time which elapses between the application to a railroad, asking them to lay a switch for a new operation, and the performance of the work by the railroad, appears to be unnecessarily long. The amount of red tape that must be gone through before this can be done is almost unbelievable. In many cases, the

mine will be in readiness to ship coal before a switch is placed. It is not uncommon for a period of six months to go before anything is done, and, in one instance, I knew a whole year to elapse before the switch was finally laid.

It is unquestionably true that a certain amount of form is necessary and agreements must be signed by both parties, but it does seem that this necessary procedure should be expedited and any unnecessary delay avoided, for the sake of expediency if for no other reason. In the present speeding up of the coal production, it is more than ever important that all work preliminary to the opening up of a new mine should be pushed forward as rapidly as possible.

NECESSARY BACKING OFTEN DIFFICULT TO SECURE

Another hindrance to the development of new coal properties that are owned by men whose means are limited is the inability to secure a sufficient loan for the purpose. It is easier for larger operations to get the backing that they need; but banks hesitate to make a loan of sufficient size for the successful launching of a small property. It may be that the owner is a man of experience in coal mining and has operated properties for other companies successfully and is anxious, now, to run a mine of his own. His desire may come from patriotic or financial reasons.

The sum asked to enable an owner to open and equip a mine will generally seem exorbitant to a banker who is unfamiliar with mining requirements; and he makes the excuse that the unsettled condition of the coal business and the instability of market prices will hardly warrant advancing the money. In one instance that has come to my knowledge, a bank offered to advance the amount asked, provided they received a donation of one-fifth of the stock from the coal companies, which is clearly a high rate of interest to be paid for a loan.

In closing, allow me to ask why it would not be possible, during the period of the war, to establish a loan bank for the purpose of financing new operations, and conduct it on a plan similar to that of the "Farmers' Loan Bank," which has played such an important part in fostering agricultural growth in this country. Under such a provision, there would be no chance for profiteering, as the mine would be owned by the Government until the loan was satisfied. If the plan has worked well for the farmer, why has not the miner a right to an equal privilege?

M. P. H.

—, W. Va.

Loading and Shipping Clean Coal

Letter No. 3—I have read with interest two editorials and several letters relating to the fuel situation and the need of securing good clean coal in the market, which has recently been flooded with impure coal. It seems to me that both the miner and the operator are equally to blame in this matter. They forget, apparently, that the shipping of a poor quality of coal will give the mine a bad reputation and injure both of them.

In every contract entered into between operators and the United Mine Workers of America, and in every district under the jurisdiction of that organization, provision is made penalizing the loading of dirty coal or any impurities that could, in reason, be kept out by

the miners. The failure of the operators to impose these penalties when a miner loads dirty coal is a grave error.

To overcome this difficulty, a law should be adopted that would enforce punishment on both the miner and the operator for the shipment of coal without its first being properly cleaned at the mine. For the protection of the miner against persecution on the part of petty bosses, for personal reasons, or because of alleged activity in the union, there is a clause inserted in the contract, safeguarding the miner against unfair discrimination.

Honest and competent miners have absolutely no sympathy with a laborer that will load dirty coal; but the miner is often from 300 to 400 ft. away from where the laborer is loading cars. This is particularly true in pitching seams and, on this account, the miner cannot always be held responsible for the loading of impure coal. A good miner knows well that the desirability of the coal shipped to market depends largely on the care taken in its preparation. He recognizes that the shipment of a poor quality of coal is a menace to the mine, which cannot run regularly when the demand for coal slackens, unless the place has a reputation for putting out good coal.

The high wages paid for mining has attracted many men who know nothing of the requirements of coal mining. Such men care little what they load and are often unable to distinguish between bone and coal. Their chief aim is to draw big pay. They, as well as some old miners, think that, at this time, any kind of coal will have no difficulty in finding a market.

ONE SOURCE OF IMPURITIES IN COAL SHIPMENTS

Referring to the letter of W. R. Jones, *Coal Age*, Mar. 16, p. 513, it appears to me that he has overlooked some important reasons when he stated that "there are two responsible sources for the shipment of impure coal to market . . . (1) dishonest miners who will fully load slate and rock with their coal in order to increase their daily tonnage . . . (2) small mines that have no means of properly cleaning the coal, or that are compelled to work in seams of inferior quality."

Before the war most of the larger mines had erected washeries. The coal shipped from these mines was sold in two grades or classes; namely, "fresh-mined coal" and "washery coal," the latter being classified as "No. 2," in quality. Since the Government fixed the price of coal, the entire output of the mines is sold at the same figure, no distinction being made in the quality of the shipments.

Again, as is well known, there are different kinds of mechanical slate-pickers or separators, some depending on the difference of the specific gravity of rock, slate, bone and coal, and others depending on the difference of the form in which coal and slate breaks, and the difference in velocity with which coal, slate and bone slide down an incline chute. In the present hurried preparation of coal for market, these differences are not as effective in securing the separation of coal from its impurities.

Some time ago Inspector Ryan was called to Plymouth (Penn.) to inspect a shipment of washery coal billed as "fresh-mined coal," and found it to contain 60 per cent. of slate, there being more slate than coal.

The suggestion of Mr. Jones that the smaller mines, not having the same facilities for cleaning the coal as the larger mines, should be shut down, appeals to me as an unfair discrimination, since the smaller mines can still clean their coal by hand-picking, which has always been their method. I agree with him that those seams containing too high a percentage of ash and sulphur should not be worked. The same may be true also of seams having only a clay roof. However, as I have previously stated, if operators and miners alike will do their part there will be no difficulty in obtaining clean coal, now as before.

FRED B. HICKS.

Kingston, Penn.

Letter No. 4—From every side, this subject calls for serious consideration. The difficulty experienced in many localities of securing the necessary labor has no doubt restricted the operation of mines and has had its effect in creating an unprecedented and urgent demand, and this condition has been offered as a possible excuse for the shipment of an inferior quality of coal. However, in my opinion, the situation is aggravated by the inadequate equipment of many mines that has made it practically impossible for them to meet the present demand made upon them. This and the inability of the railroads to furnish the necessary cars for shipment has made it impossible to operate the mines continuously.

Now, if these facts are true, there is no room for excuse for the shipment of impure coal because of the failure to properly clean the coal by separating the slate and other impurities when loading the cars at the working face. This is chiefly the result of laxity of supervision by mine officials.

MINERS HAD AMPLE TIME TO CLEAN THEIR COAL OWING TO SLACK CONDITIONS

The advent and continuance of a severe winter greatly hampered transportation. Rivers and lakes were frozen, and railroads were greatly impeded. Under these conditions, I repeat, that had mine officials, whose duty it was to see that the coal was properly cleaned, given this matter suitable attention, there would be no reason for complaint in regard to the quality of coal sent to market. My point is that the want of time to properly clean the coal cannot be urged as an excuse for this lack on the part of mine officials; there was plenty of time and only clean coal should have been loaded.

The present, it will be agreed, is no time for criticism of the past; but our efforts must now be exerted to rectify mistakes in the quickest manner possible and with the utmost forbearance. Reflecting on the recent demand of the President, that the head of each special department should use his utmost endeavor to straighten out business in his charge, one cannot help but feel that the same spirit should animate all mine officials, and that they should give unremitting attention to the loading of clean coal at their mines.

The loading of dirty coal is an old sore that for 20 or 30 years has troubled mine operators who have striven to gain a good reputation for the quality of coal sent to market from their mines. The study of the question shows that the trouble lies largely at the coal face, and that greedy miners, with little or no conscience, do not hesitate to load dirty coal if they can escape detection and avoid being docked. No miner, organized or un-

organized, will deny the fact that the loading of a mixture of coal and slate is an injury to the mine.

To realize the effect of this dishonest practice on the part of some miners, it is necessary to look at the situation broadly. For example, a train crew hauls a shipment of, say 30 cars of 50 tons capacity from a mine. When this coal has been bunkered, it matters not how or where, whether in the factory, on shipboard, or in domestic use, we will say that 30 tons of slate have to be thrown out from this shipment. In other words, 2 per cent. of the coal purchased cannot be burned, and the consumer is burdened with the expense of its disposal as refuse. What the dishonest miner has gained is paid for by the consumer. Let every miner strive to do his part and bear his share of the present burdens laid upon him by reason of the war.

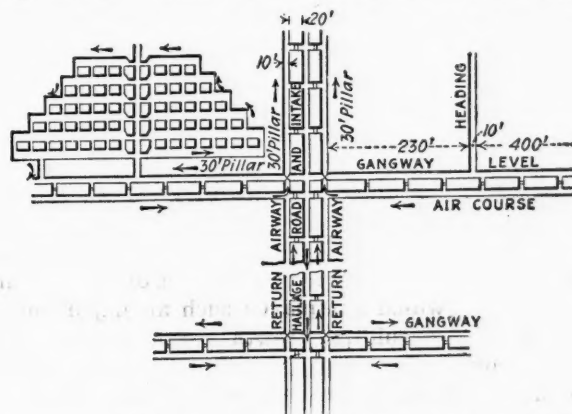
West Leisenring, Penn.

R. W. LIGHTBURN.

Working 10-Ft. Inclined Seam

Letter No. 1—In response to the request, *Coal Age*, Mar. 23, p. 561, asking for the best method to be employed in the working of an inclined coal seam, 10 ft. in thickness and overlaid with a soft sandy shale that makes a weak roof, permit me to offer the following method, which my experience recommends as particularly adapted to the working of this seam.

It is stated in the inquiry that the inclination of the seam is from 15 to 20 deg. and that it contains many irregularities faults and "pinchouts." The floor of



PROPOSED PLAN OF WORKING

the seam is said to be a sandy shale. In order to obtain the greatest possible extraction of coal at a minimum cost, under these conditions, I would drive three main slopes on the full dip of the seam. These slopes should be each 10 ft. wide and from 6½ to 7 ft. in height. They should be driven on the floor of the seam, leaving from 3 to 3½ ft. of roof coal above them and separated by 20-ft. pillars. Let me say, here, that the height of all slopes, cross-entries and headings should be varied so as to conform to any natural parting that may be present in the seam.

DESCRIPTION OF THE GENERAL PLAN OF WORKING

The accompanying figure shows the general plan of the workings. Cross-entries are driven in pairs to the right and left and at right angles to the main slopes at distances of 1000 ft. apart. These cross-entries are driven slightly above the level course so as to provide good drainage, which will also give a grade in favor

of the loaded cars. The cross-entries are separated by the same width of pillar as the main slopes.

In order to secure the best results and reduce the cost of timbering and the upkeep of roadways and secure a maximum of safety in the workings, about 6 ft. of coal should be taken out in the first working in the rooms, the remaining 4 ft. of coal being left for roof and taken down when drawing back the pillars.

DEVELOPMENT OF THE WORKINGS

When the main slopes and the first pair of cross-headings have been driven far enough, a heading is driven 10 ft. wide on the full pitch of the seam. As shown in the sketch, the first heading is started at a distance of 230 ft. from the main slope airway. This will provide for a solid pillar of coal 30 ft. wide flanking the main slopes and allow for the driving of rooms 200 ft. in length off the heading. Later in the development, a second heading is driven of the same width, at a distance of 400 ft. from the first, which will provide for rooms 200 ft. in length, to be driven on the strike of the seam to the right and left of each heading.

The rooms off the headings are driven 15 ft. wide, the first rooms being started at a distance of 30 ft. from the gangway, which leaves a 30-ft. pillar for the protection of the cross-entries, the same as on the main slopes. The rooms are driven on 30-ft. centers, which makes the room pillars 15 ft. in width. Breakthroughs or crosscuts are driven in the pillars every 15 ft. apart, as shown in the figure.

DRAWING BACK THE PILLARS OR "STUMPS"

This method provides a series of small stumps or pillars 15 ft. square, which can be taken out conveniently in retreating when the 4 ft. of roof coal is also taken down. The rooms being only 200 ft. deep minimizes the work of handling the coal from the face of the rooms to the heading, where self-acting jigs are employed to lower the cars to the gangway.

A system of endless rope haulage can be used on the main slope, the center slope being made the haulage road and intake airway. I should not recommend a double track slope, but would use one of the side slopes for returning the empties into the mine. The two side slopes serve as return airways for their respective sides of the mine.

The rooms should be timbered by a double row of posts staggered, while the track is laid along one rib.

South Burgettstown, Penn. ANDREW ORR BAIN.

First Aid to the Uninjured

Letter No. 4—The question of lending "First-Aid to the Uninjured" is so broad and involves so many features that one is led to ask, where shall we begin the discussion, and when it is finished will it have accomplished anything worth while? In other words, will mine officials feel any more deeply their responsibility for the safety and health of the men in their charge and be induced to give closer attention to making the mine safe and comfortable for work?

The records show that the greatest number of fatal and nonfatal accidents in mines are due to falls of rock, slate and coal. It is also well known that any

able bodied man who is a member of the Miners' Union can get work at a coal mine, for the asking. If the man cannot drive a mule, run a motor, lay track, or set timbers, he is given a place to dig and load coal. No questions are asked regarding his ability to safeguard his life and the few instructions that he may receive are a poor sample of what can be classed as first aid to the uninjured. At the present time particularly, very much the same state of affairs exists at a nonunion mine.

While I am willing to admit that many inexperienced men must be employed to work in the mine, I am unwilling to be held responsible, as safety inspector for the lives of such men when they are permitted to work by themselves. Safety demands that an inexperienced man shall work with an experienced miner for a period of six months, or until he has learned how to protect himself from danger. If the two men earn, say \$10 a day, the experienced miner should receive \$5.50 and the inexperienced man, \$4.50. By this means, there will be fewer accidents recorded from the fall of rock and coal.

DEATH RATE IN COLORADO MINES REDUCED

An examination of the records of accidents in Colorado mines during 1915 and 1916 shows a reduction in the death rate in this state, in these two years, from 5.1 to 3.35, per thousand men employed. This is a creditable showing for the earnest activities of the deputy inspectors, in the enforcement of the timber agreement of 1916. The work of the deputies can rightly be called "First Aid to the Uninjured."

Let me say, here, that there is not sufficient thought and attention given to the employment of inexperienced men in the mines, and if we continue in this course it will be useless to write suggestions of first aid to the uninjured. However, let me suggest one means of giving this kind of first aid and reducing the number of accidents from falls of roof, slate and coal. It is as follows:

ENFORCE STRICTLY THE TIMBER AGREEMENT

Let the mine examiner (fireboss) examine each working place, in the morning, to see that the timbers are set in accordance with the timber agreement that I have mentioned. If he finds the timbers are not set as the agreement requires, let him notify the miner working in that place that he will lose his turn and no cars will be set in for him for 24 hours. The miner should then be instructed to reset the timbers to conform to the agreement and in the presence of a mine official. When this is done, the miner should be sent home unless there is good reason for his being excused for his neglect. For a second offense of the same kind, the miner should be discharged and his name reported to the state mine inspector for future reference.

By doing this, I believe that it may be possible for us to get somewhere in our efforts to give first aid to the uninjured. I am not in favor of blacklisting a man for his neglect or disobedience of orders. The record for the year 1917 shows clearly that eternal vigilance is the price that must be paid if we are to reduce still further our mine-accident rate.

Farr, Colo.

ROBERT A. MARSHALL.

INQUIRIES OF GENERAL INTEREST

Cubic Contents per Ton of Coal

To settle a dispute that has arisen, kindly show how to calculate the weight of coal, in tons, and the amount, in bushels, that a wagon bed will hold whose dimensions are 10 ft. long, 3 ft. wide and 22 in. deep.

Grafton, W. Va.

S. F. & V. N.

The cubic contents of this wagon bed is $3 \times 10 \times 22 = 660$ cu. in. In estimating capacity, it is customary to allow 40 cu.ft. per short ton of bituminous run-of-mine coal. Hence, assuming that the wagon bed was loaded level full, the coal being 22 in. deep over the bed, the weight of coal in the wagon would be $660 \div 40 = 16\frac{1}{2}$ short tons.

The laws of West Virginia make the weight of a bushel of coal 80 lb., which gives 25 bu. in a short ton, and makes the amount of coal in the wagon when level full $16\frac{1}{2} \times 25 = 412\frac{1}{2}$ bu.

More briefly stated, the amount of bituminous coal in a bin or wagon, in bushels, is equal to $\frac{1}{2}$ of its volume in cubic feet, and the weight, in tons, is $\frac{1}{2}$ of the number of bushels. All of these rules are based on an average specific gravity of 1.3 for run-of-mine bituminous coal.

Gasoline Motors in Mines

We are installing a home-made gasoline haulage locomotive in our mines. The driver, or motorman, claims that when operating the locomotive on the last of the air, the fumes become very offensive. I am writing to ask if you, or any of the practical readers of *Coal Age*, can suggest some way of overcoming this objection.

Coal City, Iowa.

H. N. ROGERS, Secy.

Southern Iowa C. & M. Co.

The use of gasoline locomotives in mines has frequently been referred to, in *Coal Age*, as being attended with danger. It has been stated that its use should be confined wholly to the intake airways, where there is a good current of air continually passing.

The deadly effect of the exhaust gases of a gasoline motor when used in the limited confines of a mine, or any other close place, has been fully discussed and was treated editorially in *Coal Age*, Vol. 10, p. 549, under the title "Petromortis." Particular attention was then drawn to the fact that the danger arising from the exhaust gases of this type of motor is greatly increased when its use is permitted where the air is stagnant, as in a pumproom or other closed place that is not thoroughly ventilated by a current of fresh air. The same is true when a gasoline locomotive is operated in a mine, on the last of the air, as in a return airway.

It was further stated, in the editorial just mentioned, that particular danger arises when such a locomotive is running with the air. Especially is this true when the machine is hauling a loaded trip up grade

and the engine is not in perfect order, since in that case the character of the exhaust gases is very apt to be more deadly than when the engine is working properly.

Again, when a locomotive is advancing with the air, the motorman is liable to be overcome with the gas, which then travels with about the same speed as the locomotive. This might result in a serious accident due to the motorman becoming unconscious and failing to control the movement of the trip. On page 552 of the volume of *Coal Age* just mentioned, an instance is given of the fatal results of operating the gasoline motor of an automobile, in a garage, causing the instant death of a man and his wife by breathing the deadly gases. On page 688, in the same volume, a correspondent has suggested that the exhaust gases of a gasoline motor may contain 1 per cent. of carbon monoxide, while 0.1 per cent. of this gas is fatal when breathed but a short time.

It is the deadly effect of the exhaust gases of a gasoline motor that renders its use in mine workings extremely hazardous. To our knowledge, there is no way of overcoming or preventing this effect and rendering the exhaust gases harmless, except by providing for their rapid diffusion in an ample air current; and, even then, danger may arise from unavoidable causes.

Notwithstanding this fact, however, there are numbers of gasoline locomotives in use in mines, in different localities. The advantage claimed for this type of locomotive is that its power is self-contained, which enables the locomotive to go anywhere where track is laid, without depending on a trolley system.

However, the more recent development of the storage-battery locomotive has given to the mining industry a machine that presents peculiar advantages and makes unnecessary the use of gasoline in the mine. There is no doubt that the gasoline locomotive reduces the cost of haulage wherever the conditions are favorable to its use.

The gasoline locomotive is particularly useful on long outside haulages, where the tippie is located at some distance from the mine entrance, which is the case in many mines where this type of locomotive is employed. There are, no doubt, particular instances where the machine can be employed without danger on the main haulage road of a mine when this is the main intake airway, and the volume of the current is such as to render practically harmless the almost inappreciable volume of the exhaust gases of the motor.

At times, it may be possible to arrange the ventilation so that the underground haulage, from the main parting to the tippie, is ventilated by a separate current of air, which is not permitted to pass into the mine but is conducted at once into the main return airway. In this case, the main intake airway supplying the circulation in the mine is not affected by the operation of a gasoline motor.

EXAMINATION QUESTIONS

Bituminous(Penn.) Mine Foremen's Examination, April 9-12, 1918

(Selected Questions)

Ques.—The rubbing surface of a square airway 4000 ft. long is 128,000 sq. ft. (a) What is the area and perimeter of the airway? (b) What is the velocity of an air current if its volume is 19,200 cu. ft. per min.?

Ans.—(a) The perimeter of an airway is found by dividing the rubbing surface by its length, which gives, in this case, $128,000 \div 4000 = 32$ ft. Since this airway is square, the length of each side is $32 \div 4 = 8$ ft. and the sectional area is, therefore, $8 \times 8 = 64$ sq. ft.

(b) The velocity is found by dividing the quantity of air in circulation by the sectional area of the airway, which gives, in this case, $19,200 \div 64 = 300$ cu. ft. per min.

Ques.—Is an accurate mine map important? Why?

Ans.—In mining, it is of the utmost importance to make and maintain an accurate mine map, showing all the airways, haulage roads, travelingways, rooms and other openings, exactly as they exist in the mine. The map should also show the thickness and character of the coal, the inclination and direction of the dip of the seam and the elevation at different points in the workings, besides the position of the boundary lines and other surface features and improvements. The direction of the air currents in the mine should be clearly indicated and the position of all boreholes shown.

The purpose of an accurate mine map is to show the correct position of the workings with respect to the boundary lines and other surface features, and the relation of the several openings in the mine to each other, so as to avoid accidents from breaking into other workings or tapping dangerous accumulations of water or gas in adjoining mines. An accurate map also avoids the loss of much coal because insufficient pillars are left and rooms are permitted to break into each other, or a squeeze is started that crushes the pillar coal and prevents its removal. When a mine is abandoned, it is necessary to place on file an accurate map of the workings, as a safeguard of future operations.

Ques.—When do you consider a mine properly ventilated?

Ans.—A mine is properly ventilated when there is a sufficient quantity of air in circulation to comply with the requirements of the mining law, provided this air is properly distributed so as to ventilate each section of the mine separately and furnish each section with its proper proportion of air. The air current must also be conducted into each working place and made to sweep the face of the coal in sufficient volume and with sufficient velocity to prevent any accumulation of gas in those places.

It is also necessary that all abandoned and void places in the mine shall be properly ventilated and that mine stables be ventilated by a separate air split that passes directly into the return airway by which it is carried out of the mine. In any case, the volume and velocity of the air current in all portions of the mine must be sufficient to render the workings safe and keep them in a healthy condition.

Ques.—Do you consider the driving of places on sights important? If so, state why.

Ans.—It is important that each working place be driven on sights so that it will keep its proper direction and there will be no danger of leaving too thin pillars that will be hard to remove. Where the working places are not driven on sights properly established, it is difficult to maintain a uniform thickness of pillar between the adjoining rooms, and this will often cause heavy roof falls or induce a squeeze that will destroy the pillars and make it impossible to recover all the coal.

Ques.—An entry is driven 400 yd.; the cost per yard is \$2; the drain alongside cost 15c. per ft. Ties spaced 2 ft. between centers cost 17c. each. The T iron for the road weighs 35 lb. per yd., is in 30 ft. lengths and costs \$50 per gross ton. The spikes are worth 2c. each. Splice-bars cost 60c. per pair. What is the total cost of the headings?

Ans.—Following are the items of cost: Yardage, $400 \times 2 = \$800$; drain, $400 \times 3 \times 0.15 = \180 . There is $3 \times 400 = 1200$ ft. of track, which will require $1200 \div 2 = 600$ ties, costing $600 \times 0.17 = \$102$. The 400 yd. of track will require 800 yd. of rail. The weight of this rail is $800 \times 25 \div 2000 = 10$ tons, making the cost $10 \times 50 = \$500$. Allowing four spikes to each tie will require $4 \times 600 = 2400$ spikes, at a cost of $2400 \times 0.02 = \$48$. The length of each rail being 30 ft. or 10 yd., the number of rails required to lay this track is $800 \div 10 = 80$, which will require $80 - 2 = 78$ pairs of splice-bars, costing $78 \times 0.60 = \$46.80$. The total cost of the heading with track all laid, exclusive of labor, is, therefore, the sum of these items, which is \$1676.80.

Ques.—Given the dimensions of an arched airway as follows: 9 in. high to top of arch, the radius of the circle being 4 ft. 6 in. If the current of air is 450 ft. per minute and a half what is the total quantity of air passing per minute?

Ans.—The question probably intends to give the height to top of the arch is 9 ft. instead of 9 in. Taking this to be the case, the size of the rectangular portion of the cross-section, below the arch, is 9 ft. wide by $4\frac{1}{2}$ ft. high, and its area is $9 \times 4\frac{1}{2} = 40.5$ sq. ft. The area of the semicircular portion forming the arch is $\frac{1}{2} (0.7854 \times 9^2) = 31.8$ sq. ft. The total sectional area of the airway is, therefore, $40.5 + 31.8 = 72.3$ sq. ft. If the average velocity of the air current is 450 ft. per min. the quantity of air passing in this airway is $450 \times 72.3 = 32,535$ cu. ft. per minute.

COAL AND COKE NEWS

Harrisburg, Penn.

Rumors are afloat that some of the bituminous operators were disobeying the regulations calling for clean coal by shipping poor fuel on the assumption that the Government would reject it and turn it over to the second-class bunker coal pool for ships at a price higher than that allowed for domestic purposes. "We are going to put a stop to this scheme," the state fuel administrator is quoted as saying. "We now have a general inspector who is active at destination. The demand that this practice be stopped is imperative."

Last year the Philadelphia & Reading Coal and Iron Co. expended \$1,505,507 in improvements and developments of its collieries as compared with \$867,665 for 1916. The production of anthracite from its coal properties was increased 1,577,482 tons to 12,818,706 tons.

That every effort is being made to increase the output of anthracite, even though there are 22,000 fewer mine-workers than in 1915, is shown by the fact that the Lehigh Coal and Navigation Co. has undertaken at an estimated cost of \$1,500,000 additional mine developments including two modern steel breakers, one at Caska, William, where an old colliery will be reopened; the other being at Rahm. Both should be in operation by next winter and will add from 2500 to 3000 tons of anthracite to the company's output, which now averages 18,000 tons a day. For 1917 this company increased its production by 31 per cent.

All mines in the anthracite region are working to maintain the record-breaking March output. Conservation of energy with additional results through electrical means is being worked out in all parts of the anthracite fields. The Mill Creek Coal Co. has just awarded a big \$200,000 contract to the Scranton Construction Co. to install electrical appliances at its Morea colliery. The Eastern Pennsylvania Electric Light, Heat and Power Co., besides supplying the power, will also illuminate the interior of the mines and the outside plants. Steam boilers and boiler houses will be practically eliminated by the new power.

Seeking to conserve anthracite and also to hold down its locomotive fuel bill, the Lehigh Valley R.R. plans to install a big mixer plant at Ashmore, where the smallest size of anthracite by-product—what is commonly termed silt or slush in the region—can be artificially mixed with bituminous. In that way both bituminous and anthracite can be saved.

Recognizing the great necessity for the largest possible output of coal while the nation is at war, F. M. Chase, vice president and general manager of the Lehigh Valley Coal Co., has issued a strong appeal to its employees to exert themselves to the utmost. His appeal follows:

"It must be a matter of gratification to all of us to know that the Lehigh Valley R.R., over which our output is shipped, stands No. 1 in point of anthracite tonnage transported, both for the month of March, 1918, and for the three months ending Mar. 31, 1918, showing a gratifying increase over the same period of last year.

"The country will undoubtedly need more coal during the war than can be mined even under the most favorable conditions. The industry has been and will continue to be, affected by the loss of men who are 'called to the colors,' and there is no more practical way for those who stay behind to show their patriotism than to make the greatest possible effort to meet the demand for fuel, to keep our people warmed and fed and our industries in operation at full blast.

"Our boys 'over there' will be required to work every day; to put in long hours; to endure great hardships. It should be our personal effort to see that no time is wasted here; that our mines work full-handed every day. Show by example that there is no place in our ranks for the industrial 'slacker.' The individual who, in this critical time and crisis, fails to do his bit toward speeding up our vital industries is disloyal.

"Let us be able to look into the faces of the boys who return and honestly say: 'It was necessary for me to stay at home, but

I did my best to maintain conditions which enabled the soldiers and sailors to be kept well armed, well clothed and well fed."

Fairmont, W. Va.

The car supply in the Fairmont region last Monday was the best since the war started. There were 1919 cars in the district on that day, although some of them did not get placed in time to be available for loading the same day. The number of empties sent to the Fairmont district Monday will reduce the regional car shortage something like 500 cars. Every mine in the region has its full rating.

If other regions were short in car supply Monday this abundance of cars is not gratifying, for the number was even greater than could be loaded. Until the coal operators of the Fairmont district can get their organization together it is impossible to load 2000 cars in a day, and it is argued that it is unfortunate if cars are sent here when other regions are short. The car supply for week of Apr. 15-20 averaged 1052 cars a day. Coal operators are saying this week that it is always a feast or a famine.

Morgantown, W. Va.

For several years the Mining Department of West Virginia University has offered a summer course in coal mining to the men engaged in the mining of coal. The course was originally started at the direct request of the mine operators of the state and has always received their hearty support as well as that of the miners themselves. The tuition is free to any resident of West Virginia, and there are no restrictions as to admission. Any one, old or young, no matter how much or how little schooling he may have had, will be welcomed and given every opportunity.

The Short Course will be held this year from June 17 to July 27, a period of six weeks. The work has been arranged so that those who cannot come for the full course can come for any period that is convenient to them. The following subjects will be given at the times indicated: June 17-29—Explosives, Timbering, Method of Working, Prevention of Accidents, Mine Gases, First Aid and Mine Rescue Training; July 1-13—Mine Ventilation, Mine Explosions, Electricity in Mines, Hoisting and Haulage, Analysis of Mine Air and Safety Lamps; July 15-27—Mine Surveying, Mine Drainage, Mine Management, Geology and the Preparation and Use of Coal.

The course is comprehensive and one well-calculated to improve a man's knowledge of the coal-mining industry and to put him in line for promotion. The men who have taken the work in past years have been enthusiastic in their reports of the benefits they have secured and the advancement which has resulted.

Prof. C. R. Jones, Dean of the College of Engineering, or Prof. A. C. Callen, head of the Mining Department, Morgantown, W. Va., will be glad to furnish any further information which may be desired.

Charleston, W. Va.

A telegram has been received by an officer of the Central West Virginia Coal Operators' Association from Carl R. Gray, former president of the Western Maryland, now assistant to Director General McAdoo, stating that a special representative of the railroad administration would be sent to the Fairmont region to investigate the car situation there, which has become extremely serious, as will be evident when it is stated that so many of the miners have given up hope that there will ever be any improvement in the situation that they are leaving to secure employment elsewhere. A canvass of 82 out of 200 mines disclosed the fact that more than 700 miners have left.

The claim is made by operators in this section that though under Government control coal cars are supposed to be pooled for distribution to the various coal fields, and that though cars are ordered sent to West

Virginia through the Federal pooling office at Pittsburgh, they are not being received in this part of the state, while on the other hand, the Ohio and Indiana fields receive more cars than they can load.

Speaking in opposition to the Government control of railways, Z. T. Vinson, coal operator and lawyer, in the course of a speech before the Rotary Club of Huntington, claimed that only 52 cars were furnished for every 100 car capacity produced. In Alabama he said the decrease in the supply of cars has been only 1 per cent.; in other words that there are 99 cars for every 100 cars of coal produced; in Oklahoma and Arkansas, 97 cars; southwestern Virginia, 89 cars; Illinois, 82 cars; Indiana, 80 cars; Ohio, 75 cars; Pennsylvania, 90 cars; but in West Virginia, which he described as the greatest coal field in the world, there are only 52 cars for every 100 cars produced. Mr. Vinson also claimed the division of the market into zones was unfair to coal producers.

Following on the heels of the meeting of the American Mining Congress at Washington, Apr. 23, coal operators of the state will meet at Huntington on Friday, Apr. 26 to form a state coal operators' association. Interest taken by operators in the approaching meeting presages a very large attendance and the formation of a strong organization at the outset.

PENNSYLVANIA

Anthracite

Scranton—Under the terms of an agreement recently entered into between the New York, Susquehanna & Western R.R. and the Jermyn Coal Co., operating a mine at Old Forge, the latter promises to pay the owners 70c a ton for all product sizes, while for the smaller sizes, including culm, dust and slush 50c a ton must be paid. Compared with royalties of five years ago, the new agreement is a 100 per cent. jump. The fact that culm and slush are included is also something new.

Harleton—New regulations to promote safety in and about the anthracite coal mines were suggested recently by officials of the Lehigh Valley Co. They are as follows: Men operating machinery should not wear flowing neckties, loose clothing or torn gloves. Men oiling machinery should not wear gloves along moving line shafts. Carpenters should not throw blocks on floors in workshops. Breaker employees should see that their shoes are tied before descending steps. Don't wear oily clothing while firing furnaces. Watch for protruding nails in timbers. Submit to surgical treatment for every injury regardless of its supposed minor character.

Special mention has been made by the Lehigh Valley Coal Co. of the record of William F. Hamor, veteran foreman of the Jeanesville colliery, where no fatalities have occurred within three years. It is said that few mines in the anthracite field can claim this distinction.

Millersburg—The McCollan coal storage yards, the largest in the country, closed down for an indefinite period on Apr. 23 because of lack of coal to store. The plant when running at full capacity employed from 50 to 100 men. The fires were withdrawn from under the nest of boilers and only about nine men will be retained, who will make extensive repairs to the plant during the summer. The yards are owned by the Susquehanna Collieries Company.

Tower City—A fire discovered in one of the breasts in the East Brookside colliery caused considerable excitement for a short time. Men were sent for at once and they worked for about 24 hours putting out the fire and beating back the gas to avoid an explosion.

Pittston Junction—Property owners who have suffered heavy damages from mine caves have banded together as the Pittston Surface Protective Association and have decided to start injunction proceedings against the White Coal Co. and others who are removing the supports from beneath Pittston homes, which is alleged to have caused thousands of dollars worth of damages. For the past three years there have been mine settlements in and around Pittston, but in the recent past the caves have become more numerous and far more disastrous. About 50 homes have been damaged.

Mt. Carmel—The Susquehanna Collieries Co. and the Philadelphia & Reading Coal and Iron Co. have been asked by the War Department to rush to Washington as speedily as possible the names of all miners and expert mechanics drafted for the army. The Government proposes to withdraw such experts from the infantry and assign them to specially organized units of engineers to be sent to France. Several hundred miners, laborers and mechanics have been sent out of this district through the draft and are in army camps or in France.

Tamaqua—It was announced during the week that Liberty Bond subscriptions at the Lehigh Coal and Navigation Co.'s Panther Creek Valley collieries had reached \$383,000, about 94 per cent. of the employees having subscribed. An effort will be made to make it 100 per cent.

Hazleton—Two extensive contracts in the Hazleton region have been discontinued for the present. Dick & Co., contractors for the Lehigh & Wilkes-Barre Coal Co. at Audenried, are unable to work due to the scarcity of men. At Harleigh the strippings have been closed until labor conditions are better.

Upper Lehigh—The Upper Lehigh Coal Co. engineers are getting out the plans for a steel breaker to replace the present wooden structure, which will be continued in operation while the new breaker is in course of erection.

Bituminous

Ponxsutawney—The Juneau Coal Mining Co., of this place, operating the Juneau mine on the Buffalo, Rochester & Pittsburgh Ry., near here, has sold the operation to the Empire Coke Co., of Geneva, N. Y. The entire production will be shipped to the byproduct ovens of the Empire company. The mine is being operated under the name of the Juneau Operating Company.

Johnstown—The attendance at the examination held by the various state mine inspectors of western Pennsylvania last week, for certificates of mine foremen and firebosses, was the smallest for years. The reason given in most cases was that the young men were in the Army. The average age of the applicants this year was considerably above that of previous years.

Indiana—Work has been started on the erection of the large repair shop of the Rochester & Pittsburgh Coal and Iron Co. here. It is located on Oakland Ave. at the corner of the Buffalo, Rochester & Pittsburgh Ry. All the mine cars, etc., for the various mines will be built here as well as the general repair work. It is also planned to cut the lumber for the houses at this plant, thus saving time and waste in putting the houses up at the mining towns.

Uniontown—J. H. Oilman, Jr., of Pittsburgh, recently closed a deal for two tracts of coal land in Luzerne township, representing an investment of over \$90,000. Mr. Oilman purchased a two-third interest in the Henry Cox farm, consisting of 111 acres, at \$722 an acre, and the coal underlying the farm of George Hibbs, comprising 90½ acres, at \$840 an acre.

Washington—The Lilley Coal and Coke Co., of West Brownsville, has purchased 200 acres of coal land east of Washington from the estate of John Shrontz. The purchase price was \$65,000. The company had previously acquired several hundred acres in the immediate vicinity and is now preparing to sink a shaft.

Latrobe—Officials of the Greensburg-Eastern Coal Co. have purchased the Daily and Showalter tracts of coal, near this place, the consideration being \$40,000.

WEST VIRGINIA

Bluefield—An epidemic of grip and measles throughout the Pocahontas coal fields has cut down coal production to less than 50 per cent. normal. During the past week operators say production was cut down 100,000 tons because of illness of miners. The epidemic came just at a time when the car supply was better than at any time during the past six months.

Newlyn—The Weewyn Coal Co., recently incorporated with a capital of \$25,000, is now developing about 200 acres of coal lands at the mouth of Arbuckle Creek. The company is planning for additional development work. H. P. Thomas is president and manager; P. H. Henry is vice president.

Charleston—Examination for mine foremen and firebosses will take place at Charleston on May 21, 22 and 23; Fairmont, May 28, 29 and 30; Thomas, June 4, 5 and 6; Mount Hope, June 11, 12 and 13; Welch, June 18, 19 and 20; Logan, June 25, 26 and 27.

Charleston—There were 33 fatalities in West Virginia coal mines during the month of March, according to the monthly report of the State Department of Mines. Fourteen deaths were caused by roof and coal falls, ten by mine-car accidents, four by explosives, one by a motor accident, three from miscellaneous causes and one happened outside the mine workings.

Clarksburg—Though delayed by the failure to secure steel for its switch, the Bowery Coal Co., of Lost Creek, having completed the development work at its new plant, will be ready to ship coal just as soon as switching facilities are provided.

Madison—The Bradley Coal Co., recently chartered, has perfected an organization by electing S. E. Bradley as president, O. C. Chambers as secretary treasurer, and W. W. Bradley as superintendent. Construction of the company's plant has been under way for the last month and by July 1 the company believes it will be able to ship coal.

Grafton—Repairs are being made to the plant of the East Grafton Coal and Coke Co. at Thornton in the renewal of the sinking shaft and by the addition of several boilers to the power plant.

Philippi—The Philippi Gas Coal Co. expects to start shipping any time now. It is owned by Clarksburg capital.

Mannington—A tract of coal land, which includes 2419 acres in Mannington district, in Marion County, and Grant district, in Wetzel County, has been transferred and the transaction recorded in the county clerk's office, indicating early development. The tract lies just above the Rachel Gas Coal tract at Downs. Attorney Charles F. Kefover, of Uniontown, Penn., recorded the papers.

Fairmont—U. G. Wilkinson Co., of Pittsburgh, engaged on the transfer of the Empire tract (Davis and Elkins tract) to the New England Fuel and Transportation Company, since last August, complete their work here this week. The New England Fuel and Transportation Co. took over this big tract and resold a great deal of it.

Matoaka—The Wright Mining Co., a wagon mine, is engaged in shipping coal from the No. 3 Pocahontas seam. The capacity at present is two cars daily. R. T. Wright is manager. H. D. Harman and Lathrop O'Keefe are also interested.

The Pawama Coal and Coke Co. is doing its "bit," having produced a record tonnage for the month of March. The plant is newly painted, and six new houses have been completed. All the company's houses have recently been put in first-class condition and new miners are coming in for work daily. Superintendent Roy T. Wright is to be congratulated on these improvements.

KENTUCKY

Earlinton—The St. Bernard Mining Co. has announced its intention of constructing a large power plant here to furnish power for all of its string of mines, including Morton's Gap, some 20 miles from the new plant, which will cost between a quarter and a half million dollars. Several of the contracts have been placed, the main electrical contract going to the Westinghouse company, and arranging for completion inside of seventeen months. The company recently lost its power plant at Shamrock by an explosion followed by fire, that having been the largest mine power plant in western Kentucky at the time.

Madisonville—The Sunset mine of the Coal Coal Co. has resumed operations after being down for several days as a result of a breakdown in the power plant, necessitating sending away for parts.

Harlan—The Wallins Creek Collieries Co., capital \$500,000, has purchased the property of the Wallins Creek Coal Co., containing three equipped mines capable of producing 1500 tons daily. The new owners plan increasing the output to 2000 tons. Officers of the company are W. D. Boyer, Scranton, Penn., president; S. C. Boyer, Nashville, treasurer; W. J. Nixon, Chattanooga, general manager.

TENNESSEE

Harriman—S. P. Sparks, George W. Chandler and others interested in the ownership of the Babahatchie coal mines, on the Queen & Crescent R.R., near Harriman Junction, plan reopening the mines, which have been down for several years. Capt. A. W. Evans, an engineer, has been secured to supervise the reopening of the mines.

INDIANA

Petersburg—The Muren Coal Co., with a capital stock of \$375,000, the directors being Clark Whitman, J. C. Muren and A. H.

Taylor, was organized recently. The new company owns the Muren mine, along the Southern R.R., which employs 125 men.

Oakland City—E. Hackett, of Louisville, Ky., owner of a large mine near here, is making tests preparatory to the sinking of another shaft. The new mine is to be electrically equipped and will be capable of producing a large tonnage.

Bicknell—The Bicknell Coal and Mining Co. has started to sink a new mine in the Bunting addition which will give employment to about 500 men when completed. This is the fourth new mine to be sunk here in the last year.

Terre Haute—An explosion which fatally burned three men occurred in the shaft mine of the Deep Vein Coal Co. Tuesday, Apr. 23. Searchers are unable to penetrate far, owing to the accumulation of smoke, and the fate of the other men cannot be determined. The property loss will not be heavy, but the mine's production of coal will be halted several days.

ILLINOIS

Springfield—An agreement has been reached between employees of the Jones & Adams Coal Co. and the Illinois Traction Co. relative to improved passenger service between Springfield and the mine. The miners filed a petition some time ago with the State Public Service Commission for better service. This will now be withdrawn.

H. A. Converse, fuel administrator for Sangamon County, announces in a bulletin that the railroads have consented for discarded ties to be gathered for fuel, instead of being burned by the section men to get them out of the way, and persons living near the railroads are urged to arrange with local station agents for gathering them up and utilizing them as fuel.

Johnson City—Superintendent Ralph Mitchell and Mine Manager W. B. Miller have made the Ernest mine here a 100 per cent. mine by selling every man employed there one or more Liberty Bonds, making a total of \$33,000.

Gillespie—Business men of Gillespie have organized a company and are sinking a mine just north of the town to avert the anachronism of a coal famine, which often occurs, in a town that is surrounded by some of the largest mines in the world. It has often happened that no coal could be obtained from the big mines for local use for a week at a time because the entire output was needed for filling orders. The new mine is intended to supply the local needs exclusively or to at least give them the preference.

Herrin—One of the largest sales in the past year in the southern Illinois field was that recently closed when the Chicago and Cartersville Coal Co. sold its mines A and B near here, with the washer and dry screening plant, to the Chicago, Wilmington and Franklin Coal Co. for \$1,500,000. Five thousand acres of coal and mining rights in Williamson and Franklin Counties, with 4000 acres of farming lands and valuable city property in Herrin is included. This is the largest single transaction ever made of Williamson County property. The new owners have two mines in Franklin County, one at Orient and one at Benton.

Foreign News

Montreal, Canada—Operators in the west of Canada say the output of coal the coming year will be much less than hoped for, especially in British Columbia. Labor supply has been limited since the war and is growing scarcer. Continued strikes have prevented anything like a proper production, but even with the strike situation eliminated, operators say individual miners are prepared to do only a certain amount of work each day and when they have accomplished their self-appointed quota refuse to work until the following day.

Victoria, B. C.—The Canadian Collieries (D.) Ltd., has opened its No. 5 Mine, and D. Morton has been appointed overman. He was head overman at No. 4 Mine, Extension, which has been closed down.

In the reorganization of the Merritt Collieries under the firm name of the Fleming Coal Co., Joseph Graham has been appointed general manager; A. E. Smith, mine manager; and John Brown, overman. These mines under the Inland Coal and Coke Co. have produced as high as 15,000 tons a month. The new company is taking hold vigorously, as is shown by the fact that last month, although the work may be said to have just started, 4000 tons was produced.

Personals

Leroy Walbridge, mining engineer with the Cranberry Creek Coal Co., at Hazleton, Penn., has been named to succeed **J. E. Anderson** as chief engineer.

Alex Sharp has been appointed mine manager of the Colman Collieries, Princeton, B.C., which have been reopened. It is understood that considerable development work is to be undertaken.

J. W. Montgomery, formerly mine manager of No. 7, Canadian Collieries (D), Ltd., has assumed the duties of mine manager of Nos. 5 and 6, while **J. G. Quinn**, formerly in charge of the two latter mines, has gone to No. 7.

T. B. Fisher, until recently mine foreman of mines at Twin Branch, W. Va., has been employed by the Pawama Coal and Coke Co. in same capacity. **R. Q. Mahoney** has resigned and will return to work for the Turkey Gap Coal and Coke Co., Dott, W. Va., No. 2 mine.

Edward Solomon, formerly in charge of the Solomon-Peabody mine south of Auburn, Ill., is to take charge of the new mine being sunk by the Panther Creek Coal Co., two miles north of Auburn. Mr. Solomon's successor at the Solomon-Peabody of mine is **C. C. Chadwick**.

Lloyd G. McCrum, of Somerset, Penn., general manager of the Victor Coal Mining Co., operating at Holsopple, Somerset County, Pennsylvania, on the Baltimore & Ohio R.R., was recently appointed Lieutenant-Colonel in charge of the United States Government arsenal at Rock Island, Illinois.

H. R. Russell, of Independence, Preston County, West Virginia, has resigned as general superintendent of the Preston Coal Co. and as secretary and treasurer of the Grafton Coal Operators Association, effective Apr. 22, to accept the position of general superintendent of the Cambria Collieries Co., with headquarters at Bellaire, Ohio.

J. E. Anderson, who served with Pardee & Co. for many years as chief engineer at the Cranberry workings, and later with the Cranberry Creek Coal Co., of Hazleton, Penn., which now operates the mines, has resigned and will locate in the Wyoming Valley. During his stay at Cranberry the colliery has been completely electrified, saving in one portion of the workings the services of 20 mules.

George L. Fraser, for some time an employee of the Granby Consolidated Mining and Smelting Co., has been transferred from the company's smelting center at Anyox, B. C., and has taken over the duties of general manager of the company's new collieries on Vancouver Island. He will have associated with him as mine manager, **J. W. Powell**, late of the Canadian Consolidated Coal Co., of Kentucky.

C. W. Murphy has been appointed superintendent of the Weyanoke Coal and Coke Co., Lowe, W. Va. **W. A. Craven**, whom he succeeds, is appointed superintendent of the S. J. Patterson Pocahontas Co., a company composed of practically the same stockholders. **C. W. Connor**, who until recently was superintendent of the S. J. Patterson Pocahontas Co., has resigned to engage in the mining business.

Obituary

James Vincent, assistant manager of the Whitner-Kemmerer Co., of Pittsburgh, Penn., died Apr. 17 at his home in Pittsburgh. He was a well-known coal man and was formerly sales manager of the old Pittsburgh-Buffalo Co. in Pittsburgh. He was buried in Alliance, Ohio, Apr. 19. He was aged 42 years and leaves his parents, two sisters and one brother.

Coming Meetings

Illinois and Wisconsin Retail Coal Dealers Association will hold its annual convention June 26 and 27, at Hotel Wisconsin, Milwaukee, Wis.

International Railway Fuel Association will hold a convention May 23 and 24, in Chicago, Ill., under the auspices of the United States Fuel Administration and the United States Railway Administration. Secretary, **J. G. Crawford**, 702 E. 51st St., Chicago, Ill.

American Institute of Chemical Engineers will hold its summer meeting June 19-22 at Berlin, N. H.

American Association of Engineers will hold its fourth annual convention May 14 in Chicago, Ill. Secretary, **A. H. Krom**, 29 South La Salle St., Chicago, Ill.

National Coal Association will hold a meeting May 8 at the Bellevue-Stratford, Philadelphia, Penn. Secretary, **J. D. A. Morrow**, 707 Southern Building, Washington, D. C.

Illinois Mining Institute will hold its next meeting May 23, 24 and 25, at Peoria, Ill. Secretary, **Martin Bolt**, Springfield, Ill.

American Institute of Electrical Engineers annual convention June 26-28 at Atlantic City, N. J. Secretary, **F. L. Hutchinson**, 29 W. 39th St., New York City.

American Society of Mechanical Engineers will hold its spring meeting June 4-7, at Worcester, Mass. Secretary, **Calvin W. Rice**, 29 West 39th St., New York City.

American Concrete Institute will hold its annual meeting June 24-26, at Atlantic City, N. J.

Industrial News

Frankfort, Ky.—Among the principal late incorporations of coal companies are: **Harvey Jellico Co.**, Louisville, Ky.; capital \$30,000, incorporators **E. E. Lanning**, **J. M. Dougherty** and **Edward H. Niehaus**, Virginia Mining Co., Allen, Ky.; capital \$9000; **W. G. Gray**, **R. L. Smythe** and **L. B. Harwell**, Harlan-Peacock Coal Co., Pineville, Ky.; capital \$24,000; **E. L. Shell**, Henry Broughton and **J. M. Gilbert**, Bull-Dog Coal Co., Calvin, Ky.; capital \$10,000; **E. W. Miracle**, **W. G. Cugg** and **R. W. Miracle**, Cooper Fork Coal Co., Middlesboro, Ky.; capital \$6000; **James Richardson**, **H. B. Broughton** and **Edward Broughton**.

Louisville, Ky.—The Louisville Board of Education is taking no chances with the coal supply this winter, and is spending about \$10,000 in constructing coal-storage bins at a number of the public schools which have little storage space available. A contract has also been made with the Louisville Coal and Coke Co. for furnishing 5000 tons of western Kentucky mine-run coal at \$2.40 a ton. Bids were rejected on 1000 tons of nut and slack, and will be readvertised. The board annually consumes about 8500 tons of coal but only has storage capacity for about 6000 tons.

Charleston, W. Va.—The largest coal company, when authorized capital is taken into consideration, ever incorporated, is the Federal Coal Company, which will have its main office here. The capital stock is \$3,000,000. It will operate in Boone County. The incorporators are **John E. McCully**, of Philadelphia, **Judson Harney**, of Scranton, and **H. R. Van Dusen**, **William W. Hall**, and **E. M. Johnson**, of Charleston.

New York, N. Y.—Out of a quota of \$25,000,000, the Coal Trade Committee of New York City announced on Apr. 23 that it had obtained subscriptions to the Third Liberty Loan amounting to \$6,072,150. Of this sum the subcommittee, appointed by **M. F. Burns**, the chairman of the Coal Trade Committee, to solicit the wholesale trade has secured subscriptions amounting to \$2,142,650.

The subscriptions secured by the various Borough Committees are as follows: The Bronx, \$92,200; Brooklyn, \$402,000; Manhattan, \$3,350,100; Queens, \$30,200, and Richmond, \$13,950.

The individual subscriptions include the following: **Williams & Peters**, \$200,000; **Burns Brothers**, \$100,000; **Delaware, Lackawanna & Western R.R.**, Coal Department, \$2,000,000; **Scranton & Lehigh Coal Co.**, \$75,000; **O. H. Perry & Co.**, \$25,000; **John E. Berwind**, \$100,000; **E. J. Berwind**, \$200,000; **Clinchfield Coal Corporation**, \$100,000; **Warren Delano**, \$120,000; **Texas & Pacific Coal Co.**, \$100,000; **Robert Gordon & Son**, \$15,000; **New Central Coal Co.**, \$50,000; **M. F. Burns**, \$25,000; **J. A. Renahan**, \$10,000; **F. A. Potts & Co.**, \$50,000; **Weber-Bunkelange Coal Co.**, \$10,000; **O. J. Stephens**, \$10,000; **James A. Hill**, \$10,000; **Jagels & Bellis**, \$20,000; **Dexter & Carpenter**, \$10,000; **Vinton Colliery Co.**, \$120,000; **Pennsylvania Coal Co.**, \$1,000,000; **Pennsylvania Coal and Coke Corporation**, \$300,000; **Sanders A. Wertheim**, \$25,000; **American Coal Co. of Allegheny**, \$50,000; **Meyer-Denker-Sinram Co.**, \$10,000; **Hencken & Willenbrock**, and employees, \$14,900; **Madeira, Hill & Co.**, \$25,000; **West End Colliery Co.**, \$40,000; **R. C. Hill**, \$25,000; **Price-Pancoast**

Coal Co., \$40,000; **Thomas Dickson & Co.**, \$20,000; **Ridgewood Coal Co.**, \$20,000; **Heilner & Son**, \$10,000; **Joseph B. Dickson**, \$50,000; **Thomas Dickson**, \$10,000; **Jesse L. Eddy**, \$25,000; **J. Rheinfank & Co.**, \$10,000; **Watkins Coal Co.**, \$16,200; **Theodore-Eltz Coal Co.**, \$10,000; **Willard-Sutherland & Co.**, \$18,000; **Pawama Coal and Coke Co.**, \$10,000; **F. R. Long & Co.**, \$10,000; **Adelphia Coal Co.**, \$15,000; **S. M. Schatzkin**, \$10,000; **Bacon Coal Co.**, \$20,000; **Z. O. Nelson**, \$10,000; **Richmond Coal Co.**, \$10,000; **Bulah Coal Mining Co.**, \$11,500; **S. Tuttle & Sons Co.**, \$25,000; and **Utah Fuel Co.**, \$100,000.

St. Louis, Mo.—**J. H. Anderson** has organized the Reliance Coal and Supply Co. and will open an office at 718 Equitable Building and engage in the jobbing of coal.

Columbus, Ohio—The Daniel Boone Coal Co., which is a subsidiary of the Maynard Coal Co., of Columbus, is now operating the second opening in the Hazard district in eastern Kentucky. The first opening has been worked for more than a year. The second mine is fully equipped with shaker screens and conveyor and has a capacity of 2000 tons daily. The first mine has the same capacity. The Daniel Boone Coal Co. is busy on a third mine to be located in the Lots Creek district of Kentucky on a branch of the Louisville & Nashville now under construction. The third mine will be opened about Aug. 1.

Charleston, W. Va.—Thirty-three fatalities as results of accidents occurred in the mines of West Virginia in March, according to the report of Chief Earl Harney, of the State Department of Mines. They occurred in the following counties: Kanawha, two; Braxton, Brooke, Marion, Mercer, Putnam, Tucker and Wyoming one each; Fayette, three; Harrison, four; Logan, two; Marshall, two; McDowell, seven; Mingo, four, and Raleigh two.

Philadelphia, Penn.—The annual statement of the Philadelphia & Reading Coal and Iron Co. has created much interest in coal circles. It is shown therein that the profit of the company for the year 1917 is approximately five and one-half million dollars, being an increase of nearly three million dollars over 1916. For over 40 years previous to the present boom in the anthracite industry this company, with the single exception of one year, has shown a deficit. This loss has always been met by the holding concern, the Reading company, as it is known, accepting the bonds of the coal company to the extent of each year's loss. It was always claimed that this former annual deficit in operation of the premier anthracite company was due to the heavy capitalization incident to the purchase of the thousands of acres of virgin coal land during the McLeod régime in the Reading companies.

Baltimore, Md.—The United States Industrial Alcohol Co. has awarded a contract for the construction of its proposed new steel tipple at the Curtis Bay plant. The structure is estimated to cost about \$100,000. The Ansonia Copper and Iron Works, Curtis Bay, is the contractor.

Cincinnati, Ohio—A general tie-up of coal and other traffic on the Ohio River was threatened for a few days last week, when engineers on towboats operating on the river caused a cessation of operations by refusing to run their boats until a demand for higher wages was met. The engineers asked an increase of \$30 a month, making their pay \$150 a month instead of \$120, as formerly. The difficulty was settled amicably, however, by a conference held at Point Pleasant, W. Va., between representatives of the engineers and the transportation executives of several leading coal companies, and the advance asked was granted, at least by the Otto Maumet Co., the E. J. Hickey Co. and the Campbell's Creek Coal Co.

St. Louis, Mo.—The Coal Service Bureau has compiled the following items of increased cost in the distribution of coal this year as compared to last year: Drivers' wages, 22.8 per cent.; stablemen's wages, 33.7 per cent.; pay of weighers, 38.9 per cent.; pay of yardman, 10.3 per cent.; clerk hire, 20.2 per cent.; timothy hay, 60 per cent.; oats, 100 per cent.; mixed feed, 109 per cent.; lumber, 83 per cent.; car service, 300 per cent.; iron and steel, 75 to 100 per cent.; harness and leather, 200 per cent.

St. Louis, Mo.—Bids were opened Apr. 18 by United States engineers here for the construction of 13 steel barges for the conveyance of coal and other commodities on the Mississippi River. Three of the bids were in excess of the price limit. The other three were all close to \$90,000 for each barge. The award has not been made.

MARKET DEPARTMENT

Weekly Review

*No Change in Coal Situation—Anthracite Production Affected Adversely by Labor Shortage—
Bituminous Output Shows No Betterment—Mines Still Working Short Time—Lake
Navigation Opens*

NO CHANGE of any consequence can be noted in the coal situation this week. Shipments of anthracite show a slight improvement. Orders from domestic consumers are still piling up, and retail dealers continue to worry whether they will receive enough coal to take care of the orders now on their books. The scarcity of labor in the hard-coal regions prevents the mines from working to utmost capacity, and the draft is making still further inroads on the men who are left. The situation is serious.

The steam-coal market has tightened noticeably, and there is an urgent demand for practically all the smaller sizes. The Fuel Administration's order curtailing the supplies of coal to pottery and brick manufacturers would indicate that a sharper line will be drawn between so-called essential and nonessential industries.

The bituminous situation continues to preserve its demoralizing aspect. Inquiries for soft coal are many, with

deliveries inadequate. Though production for the week ended Apr. 13 was 10,947,000 tons, an increase of nearly 18 per cent. over the output of the week preceding, it must be remembered that there was a decided falling off in production for the week ended Apr. 6. In order to avoid a coal shortage next winter the weekly output of soft coal should be over 11,500,000 tons. This average not been reached any week this year.

Reports show that there is no appreciable betterment in the car supply to the mines. Many operations are still working short time. The Fairmont region of West Virginia, however, was receiving a better supply of cars the early part of this week.

In spite of reports to the contrary, the question of what price the railroads are to pay for fuel has not been settled. The practice of assigning cars to certain mines at the expense of others is to be stopped, however, and will undoubtedly result in more even working time for all operations.

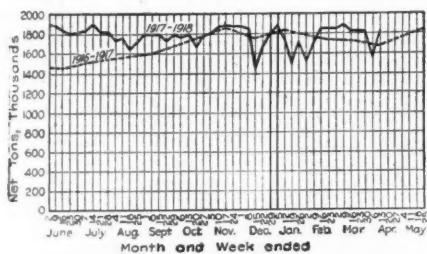
Distribution facilities this summer will not be materially enhanced either by the railroad administration's order for 100,000 coal and freight cars or the taking over of the Erie Canal. Intensive use of the canal waits on the building of barges, and it will be well along into the fall when the new freight cars are placed in service.

The coal-zoning plan is still undergoing changes. The consensus of opinion seems to be that it is working out well, in spite of the apparent hardships wrought by the system here and there.

The lake trade has opened, and coal is moving from Ohio, West Virginia and Pennsylvania to the lower lake ports. On the opening of navigation last year more coal was sent to the lake docks than the vessels could handle. This year shipments to the lakes should be made on a basis that would enable both the railroads and the lake vessels to handle it expeditiously and not overtax the available motive power.

COAL PRODUCTION

Production of bituminous coal increased 1,600,000 net tons, or over 17 per cent., during week ended Apr. 13 compared with the preceding week. The total production of bituminous coal (including lignite and coal made into coke) is estimated at 10,947,000 net tons, an average production per working day of 1,824,000 net tons, compared with an average of 1,777,000 tons for the past year and 1,680,000 tons in April, 1917. Production for the first two weeks of April is estimated at 20,264,000 net tons, approx-



imately 19 per cent. below the production of the same period of March, 1913. The total production of beehive coke is estimated on the basis of railroad shipments at 672,000 net tons, an average per working day of 112,000 net tons compared with 103,000 for the week previous.

Anthracite shipments rose from 32,223 cars last week to 37,760, an increase of over 17 per cent.

Beehive Coke—The reports of conditions in the Connellsville and adjacent-coke regions for the week ended Apr. 13 show slight improvement. Sixty-eight of the principal operators in the Connellsville, Greensburg and Latrobe districts reported production of 311,080 net tons, or 67.8 per cent. of their full-time capacity. Labor conditions improved, losses due thereto decreased from 15.4 per cent. last week to 13.7

per cent. Less coke cars were available than during the preceding week, losses due thereto amounting to 13.9 per cent. compared with 12.8 per cent. The same operators produced 162,300 net tons of coal.

Byproduct Coke—Performance of byproduct coke operators during the week ended Apr. 13 slightly exceeded that of the week of Apr. 6. The ratio of production to maximum capacity rose from 87.5 per cent. during the preceding week to 87.9 per cent. Out of 12.1 per cent. of maximum capacity which the byproduct plants of the country failed to realize in actual output, 5.5 per cent. was lost through lack of coal; 0.5 per cent. because of labor trouble; 5.2 per cent. on account of repairs to plant; 0.3 per cent. due to no market and 0.6 per cent. for all other causes. Operating conditions in the several states varied but little during the week ended Apr. 13. Kentucky was the only state to record a material increase. Maryland production of 100 per cent. week ended Apr. 6 decreased to 98.8 per cent. during the past week.

CARLOADS OF COAL AND COKE ORIGINATING ON PRINCIPAL COAL-CARRYING ROADS

	Week Ended:			
	Mar. 23	Mar. 30	Apr. 6	Apr. 13
Bituminous shipments, 123 roads	191,127	189,546	160,178*	189,952†
Anthracite shipments, 9 roads	42,487	43,642	32,223*	37,760†
Beehive coke shipments, 4 roads	13,643	13,320	12,743*	13,801†

* Revised from last report. † Subject to revision.

BUSINESS OPINIONS

Dry Goods Economist—This has been an eventful week in textile circles. Raw cotton dropped 6½c. in six days, raw silk dropped 25 cents in Yokohama, but recovered slightly. Dealings in wool continue entirely suspended pending a definite statement of the Government's needs for army purposes. Announcement was made that

British authorities have released some linens for export to this country.

Bradstreet's—Speeding up of war work, supplemented by continued heavy buying for Governmental account, excellent news regarding staple food crops, large purchases by country merchants, and improvements in transportation, stand out as the prominent currents in a rapidly moving stream. But the energies of the Government, with embargoes of preferences, make it difficult for merchants to get supplies, and at the same time further restrictions upon so-called non-essential industries operate to cut down outputs, which conditions in the aggregate militate against the freest movements in civilian lines.

Marshall Field & Co.—Current wholesale distribution of dry goods is ahead of the corresponding period of a year ago. Road sales for both immediate and future shipments show good increases over the same week in 1917. Merchants have been in to market in slightly smaller numbers. The market on domestic cotton goods continues strong. Collections are ahead.

Iron Age—Operating conditions at blast furnaces and steel works have improved steadily. The leading producer in the Pittsburgh district had 96 per cent. of its rated blast-furnace capacity active last week and 98 per cent. of its Bessemer and openhearth steel capacity. While all companies did not do so well, it is probable that April production of both pig iron and steel will exceed the excellent snowing made in March. These results will attract more than usual attention now that the Government is calling for an increasing proportion of the output. The Carnegie Steel Co. is now giving war requirements practically 100 per cent. of its rolled product and at other Central Western plants 75 to 90 per cent. of the shipments are on Government account. Surprisingly little is heard of hardship to any metal-working industry because steel mills are paying small attention to ordinary trade. Stocks are playing a part now that will be missed later.

Atlantic Seaboard

BOSTON

Car shortage unrelieved. Assigned cars rapidly being abolished, including Storrow coal all-rail. Latter is likely now to be sent to Tidewater. Increasing tonnages for New York dumping and transshipment inland from sound ports. Apprehension over any plan to exclude all-rail shipments from Tidewater territory. Conference of all-rail shippers. Hampton Roads supply curtailed by car shortage. Anthracite shipments by water continue light.

Bituminous—At this writing the New England railroads are congested with engine fuel at their various depots. Appeals have even been made to the fuel authorities for disposition, such has been the accumulation of cars under load. It is not altogether so much a piling up of large reserves as a matter of labor and facilities for unloading. However, it is a sign that the roads are much easier for coal than six weeks ago.

The requisitioning of high-grade low volatiles from central Pennsylvania for bunker use is another subject that needs to be dealt with. So long as there is a chance of getting the bunker premium the operators will be disinclined to make commercial contracts. Car supply has been so poor the past month that the general situation has not been greatly affected by this one item, except psychologically, but when the car percentage increases it will doubtless be a lively factor. The car shortage is causing real alarm not only in this territory but in Pennsylvania itself. Again there are diversions in favor of Government industries and "contracts" made with New England consumers have so far shown a light yield. It is nothing unusual for a plant using 5000 tons monthly to have had but three or four cars shipped since Apr. 1.

It is understood that assigned cars are now in process of being wholly given up. If that proves to be the fact, in the judgment of many a real gain will have been made. For some time there has been a theory that to transship by water will mean economy of transportation, but the New York loading piers are in the midst of the most congested area anywhere; and if no improvement can be made in dumping coal the proposed expedient is likely to leave some of our industries high and dry.

Today it is apparently impossible by water to keep supplied those points in Connecticut, for instance, that have usually been regarded as tributary to New Haven and other rehandling piers. Delays are such that movement by that route is shown to be inadequate, and if now no emergency supply is allowed to come all-rail there are pretty sure to be shutdowns among important plants.

There is an increasing disposition on the part of fuel authorities to limit the area into which rail shipments should be sent. A good deal of hard work has been put into this question lately, and some of it was brought out in the conference of all-rail shippers called by Mr. Storrow on Apr. 22. It is clear that cars are coming through via the Boston & Maine and the Boston & Albany in eight or nine days now instead of thirty, yet there continues to be much talk about relieving congestion on the originating lines.

The Hampton Roads situation continues uneven. Some days there is more coal than there are bottoms waiting; other days conditions are reversed. The net recent result, however, is a 20 to 25 per cent. deficiency in tonnage brought to the piers on the three roads. Car supply and not labor shortage is the difficulty. The zoning system seems not yet in full operation and then again there is much complaint over the extent to which the Virginia railroads have had their equipment scattered. Norfolk & Western and Chesapeake & Ohio open-top cars have appeared in large numbers in New England, and it was only last week that railroads here like the Boston & Maine were ordered to return foreign cars. This was temporarily an embarrassment at the rehandling wharves for the reason that a large number of New England cars have been sent to the mines for railroad fuel when the roads were making great exertions to replenish their storage piles.

The normal route for at least 50 per cent. of New England's steam coal is by water, and the largest proportion of this tonnage should come from Hampton Roads. Could that be followed through it is probable that with an all-rail movement equal to 1917 all but the less essential industries would be cared for measurably well. At the same time the outlook is none too bright.

Anthracite—A recent announcement by the anthracite committee makes it clear

there was no intention to limit the shipments to any consignee for any one month to the tonnage shipped the corresponding month in 1916. Some of the company sales agents were insisting upon such a provision, and it is a relief to know it was not authorized.

All-rail deliveries are coming through in good volume, but it should be noted they include a heavy tonnage of buckwheat and other substitutes for bituminous. Water shipments are still limited by lack of towing power, and although there are assurances of improvement there is as yet nothing visible. There are also questions of water freight to be worked out. At present there are wide variations in the cost alongside, and to such extent is this true that retail dealers in the same cities are allowed different selling prices based by local fuel boards on cost, the latter being dependent on the source of supply.

Present prices f.o.b. Port Richmond, Philadelphia, for New England shipment follow, this being the April schedule of the Philadelphia & Reading Coal and Iron Company.

	W. A.	R. A.	Lykens
Broken.....	\$5 25	\$6 70
Egg.....	5 85	6 05	6 30
Stove.....	6 10	6 30	6 70
Chestnut.....	6 25	6 30	6 70
Pea.....	4 60	4 70	4 95

NEW YORK

Anthracite stocks far below demand, with consumers demanding their winter supplies. Retail dealers' books filled with orders. Miners appealed to by the companies to "do their bit" in producing coal. Car supply reported improved the first of the week.

Anthracite—Supplies here continue to be far below demand and dealers, who heretofore have insisted upon placing orders for and receiving only what they wanted, are now willing to take any of the larger sizes of coal. Consumers have religiously obeyed the mandates of the Fuel Administrators in placing their orders for the winter supply and are now urging the dealers to make the deliveries. As a result of this urgency the dealers have their books filled with orders sufficient to carry them throughout the summer and well into the fall, unless this market is able to secure larger shipments. As it is at present the trade fails to see any encouragement ahead and is fearful of a shortage next winter.

Reports from the mines are hopeful. Operations are on a full-time basis whenever possible, and reports for the week ended Apr. 13 show that shipments amounted to 37,760 cars, an increase of 5547 cars over the previous week, or 17 per cent. This makes a total of 69,933 cars for the first two weeks of the month as compared with 37,072 cars the first two weeks in March.

The benefit to be derived by the utilization of the Erie Canal recently taken under Government control, for the carrying of freight, including coal, has been a topic for discussion by the trade. It is expected that the transportation situation will be somewhat improved, but not to any great extent, pending the construction of barges.

Stocks at the loading docks are not large. For the seven days ending at 6 a.m. on Monday of this week reports show that but 6818 cars of anthracite had been dumped.

Buckwheat No. 1, which under ordinary conditions would at this time of the year be plentiful, is about as hard to get as either of the larger sizes. Rice, barley and culm are easier. The two latter are plentiful owing to the scarcity of bituminous with which they are mixed. Quotations for barley are slightly easier than they were a week ago.

Current quotations, per gross ton, f.o.b., Tidewater, at the lower ports are as follows:

	Circular	Individual
Broken.....	\$6 15	\$6 90
Egg.....	6 05	6 80
Stove.....	6 30	7 05
Chestnut.....	6 40	7 15
Pea.....	4 90	5 65
Buck.....	4.45@5.15	4.80@5.50
Rice.....	3.90@4.10	4.80@4.50
Barley.....	3.40@3.65	3.00@4.00
Boiler.....	3.65@3.90

Quotations for domestic coals at the upper ports are generally 5c. higher on account of the difference in freight rates.

Bituminous—Operators report better car supply and that on Monday some mines which had been idle because of the absence of cars were that day receiving some.

The ruling of certain fuel administrators that no carload or bargeload lots should be delivered to individual consumers as they have been heretofore, unless permission shall have at first been obtained from the

local fuel administrator, has been modified to the extent that where consumers have been accustomed to obtain their supply in this manner in the past they should be permitted to do so, unless there is some special reason to the contrary. The practice, however, should not be extended. This ruling, which was obtained by the Wholesale Coal Trade Association of this city, also applies to industrial or other concerns which supply their employees with coal for domestic purposes. Much objection had been made to the original ruling which deprived shippers who had served certain consumers in this way for several years from this business.

Car supply has continued poor and stocks at the local docks show no enlargement. Demand is heavy and consumers are anxious to stock up. While some contracts have been closed at the Government price, these are comparatively few. There is no free coals in this harbor, everything coming here either being on priority orders or purchased before shipment.

Local operators breathed a sigh of relief on Monday upon the receipt of information that the miners in the DuBois region had decided not to strike but had requested the Fuel Administration to investigate wage conditions. The employees had demanded an increase in wages on the ground that they should receive at least part of the recent increase granted in the Government price for coal. It was reported to the miners in convention that the increase did not allow for a wage increase.

The revision of coals of the smokeless variety suitable for bunkering purposes has not resulted in any more free coal in this market. It was reported early this week that some shippers who heretofore supplied bunkers but whose coals were not now included in the pools designated by the Government were offering the stocks at slightly lower prices. It was also reported that there was to be a further change in the pools.

BITUMINOUS PRICES

	F. o. b. New York Gross	Mine Price Net	Gross
Central Pennsylvania.....	\$5.06	\$3.05	\$3.41
Maryland:			
Mine-run.....	4.84	2.85	3.19
Prepared.....	5.06	3.05	3.41
Screenings.....	4.50	2.55	2.85

PHILADELPHIA

Anthracite deliveries do not improve. Retail orders grow heavier. Public anxious for fuel. Conflict of opinion as to deliveries. Heavy tide shipments. Price rumors will not down. Labor troubles of retailers. Dissatisfaction with distribution plan. Coal now well prepared. Steam coals in heavy demand. Bituminous situation still serious. Car supply unimproved.

Anthracite—With orders piling up at an alarming rate, and no particularly great improvement in shipments, the dealers are growing restless. The urgent appeals to the public through the local fuel administration has caused the retailers to be flooded with business. It has been estimated that the orders now on file amount to 750,000 tons, being an increase of a quarter of a million tons over the preceding week. It would seem, however, that the dealers overlook the fact that they have 20 weeks before them in which to make the deliveries, and that probably the bulk of the spring and summer business has now been spoken for by the consumers.

There are some in the trade who continue to insist that all prices are likely to be revised by the authorities in Washington, and that action is sure to be taken before fall that will eliminate the individual differential of 75c., or at least bring all prices to the same basis. It is reported that some retailers who are entirely dependent upon shipments from individual shippers are experiencing some difficulty in inducing their customers to place orders. Many customers have refused to pay the higher retail price and have placed their business with dealers selling company coal. Even at that the retailers with the high-priced coal do not seem to have any difficulty in disposing of all the coal they can get, the only difference being that they are not so heavily booked for the future as their competitors; and some of them are just a little anxious on this account.

All shippers are not in harmony with the system of distribution based on the shipments to dealers during the period from April, 1916, to March, 1917, inclusive. It is becoming apparent that the officials purpose to control the distribution, despite the opposition that is being manifested. While most shippers have averaged their shipments for the foregoing period and ship accordingly, there were some concerns who started out earlier in the month to try to match the shipments month by month as

compared with the period of two years ago. It is understood now that they have also adopted the plan of averaging the shipments. Thus many customers who had not been taken on by these customers until late in the year 1916 have recently been receiving some coal. The National Fuel Administration has also notified the operators that while they may distribute any surplus tonnage over and above the period of two years ago to their customers, yet it must be considered that this tonnage is being held in reserve for the use of the Government, to be distributed later in the year, and that any portion of such surplus that is now distributed will be counted against the dealer's allotment later if it shall be necessary at that time for the authorities to call for coal for emergency use.

The steam coal market has noticeably tightened recently and many inquiries are received by the shippers for increased tonnages of practically all the smaller sizes. Recently the Fuel Administration sent out a circular notice to all operators asking them what tonnages of steam sizes they could ship to certain large plants working entirely on Government orders.

The prices per gross ton f.o.b. cars for line shipment and f.o.b. Port Richmond for tide are as follows:

	Line	Tide		Line	Tide
Broken.....	\$4.90	\$6.05	Buckwheat.....	\$3.15	\$3.75
Egg.....	4.50	5.70	Rice.....	2.65	3.65
Stove.....	4.75	6.05	Boiler.....	2.45	3.55
Nut.....	4.85	6.10	Barley.....	2.15	2.40
Pea.....	3.45	4.35			

Bituminous—The trade has lost none of the serious aspect created by the shortage of cars. It is not possible to report any improvement in the car allotment to the collieries, with the result that numerous operations are on short time. The calls for fuel are insistent, with deliveries inadequate. Yet it cannot be said that any plants hereabouts that are engaged in the manufacture of material vital to the Government have suffered.

The latest move in the zoning arrangement is the cutting off of Pennsylvania R.R. shipments into Baltimore territory. Hardly a week passes without some modification of the original zoning rules, and the general opinion seems to be that the system is working itself out along the lines of least resistance; or, in other words, shipments will, as they have in normal times, follow the lines of least resistance in a competitive sense.

Conditions among the jobbers do not seem to have changed much, although a number of them are receiving fair consignments from their shippers. Others are in a bad way and claim to be hardly making expenses on account of receiving such a small proportion of their former shipments.

BALTIMORE

Many changes under zoning system cause of some confusion in trade. The receipts of soft coal easier, but still short of local needs.

Bituminous—After several days' experience with the zoning system here, which prevents shipments of soft coal over the Pennsylvania into this territory, the trade feels that, while there are complications of a more or less serious nature, the move will probably prove of benefit to this section rather than otherwise. This view is based upon the belief that when coal begins to run better over the Baltimore & Ohio and Western Maryland, as compensation for cutting off Pennsylvania shipments, it will mean an increased dumping in this region. These two systems are so far not embargoed north. It is expected among other things that considerable coal originally marked for points north will be congested at junction points in the Cumberland gateway and will be diverted here to clean up the railroad jams. The past two weeks saw several hundred cars shifted to delivery here in order to lift congestion at Keyser, Cumberland, Hagerstown and Martinsburg.

There is some concern felt over the apparent Government plan to have Newport News and Norfolk handle all the all-water coal to New England, as much coal has been handled over the piers here for the east coast. Meanwhile the receipts over the Baltimore & Ohio have improved under a better car movement, although they are not sufficient to care for all wants at once.

Anthracite—While the Fuel Administration is urging consumers to get their anthracite supplies early, and while much business has been placed on the books, a large proportion is still out. The coal men have not been urging the taking of coal early, as receipts have not been of a nature to warrant it. The next month's deliveries here will set the pace for the retail trade in a large measure.

Lake Markets

PITTSBURGH

Coal in box cars. More Ohio than Pennsylvania coal offered. Little talk of lake shipments yet.

Coal loaded in box cars has been growing rather plentiful, at least for such an anomaly. In many cases the cars are destined to experience but one loading of coal, being intended for use in the West for grain loading, but they are permitted to carry coal to the zone limits. Box cars with Pittsburgh district coal are found only occasionally, but in Ohio they are much more numerous. Such coal usually requires a little argument in order to produce a sale, but brokers report they are generally able to move it, and collect the 15c. commission from consumers at the same time, an evidence that there remain consumers decidedly in need of coal.

Occasionally there are offerings of coal at less than the Government price, but the cases are not sufficiently common to be considered in quoting market figures, and, as a rule, they apply only to Ohio coal. Such offerings, however, are sufficient to show that the market is not altogether the one-sided affair that prevailed for so many months.

Practically nothing is being heard of lake coal, and it is evident that this movement will be taken up slowly, in accordance with the ability of the railroads and the lake vessels to get the coal through, once it leaves the mines. The common experience in the lake coal trade has been that of much more coal being sent to the lake ports, on the opening of navigation, than the vessels could handle, and nothing of that sort is to be permitted this year.

The market remains quotable at the set limits: Slack, \$2.20; mine-run, \$2.45; screened, \$2.70, per net ton at mine, Pittsburgh district. Brokers are permitted to charge 15c. brokerage to consumers and retail dealers, beyond the set prices.

BUFFALO

Car shortage not improving. Hard to get any bituminous, especially Pittsburgh. Much going to the lakes. Anthracite begins to move by lake. Local supply not large.

Bituminous—The jobber who is getting coal enough to supply any great part of his trade is hard to find. It is practically impossible to get any Pittsburgh coal, and certain of the Youngblood companies have notified their old customers that the zoning regulation has cut them out of this market. No more No. 8 will come here till that division is dropped. The lake trade is now taking a great amount of bituminous, and that reduces the supply for this section. It is already predicted that next winter's shortage will exceed any we have had so far.

At the same time certain parts of Canada are full of coal. Much demurrage has been assessed in Toronto and the surplus coal there is not out of the way yet. The reason for that is that the margin of profit allowed to jobbers is larger than it is here. Preparations are making for heavy water shipments down the St. Lawrence River as soon as the ice is out of the way, which will be in a few days. A water rate of \$2.90 net has been paid on cargoes loading at Ohio for Montreal, though this does not appear to be fully established yet.

Such a rate is considerably higher than the all-rail rate, but it insures prompt movement; and that is much when everybody is eager to get a supply early. A large fleet of steamers that can pass through the Welland Canal will go into that trade. Buffalo does not ship bituminous by lake, the limit being Erie, Penn., and Toledo, both of which do a large business. The carfries across lake Erie are active, but those from Rochester to Canada are still hampered by ice.

Prices for bituminous coal remain at \$4.45 for thin-vein Allegheny Valley, all sizes, and \$4.25 for Pittsburgh lump, \$4 for mine-run and \$3.75 for slack, all per net ton, f.o.b. Buffalo; supply scant, demand good.

Anthracite—The demand exceeds the supply, though the distribution is said to be more than it was a year ago. At the same time the careful consumer, especially if he is located away from the source of quick supply, is buying a few tons of three-quarter bituminous, which he will mix in with the anthracite next winter and perhaps get along with little or no distress and anxiety as to his fuel supply. Buffalo will

hardly do that generally, being so near the mines that enough ought to be obtainable if the winter is not too severe. It appears to be the idea that some sort of precaution is needed to make sure of plenty of fuel.

The lake season is at hand and two or three cargoes have been loaded by one company, but no rate has been made and loading will not be general for some weeks yet. Steamboat fuel is not only scarce, but no price has been fixed for it and the coal shippers, who usually provide enough for the tonnage they take, are at a loss to know what to do about it. No very regular rate was made last season, but it seems to be necessary now.

DETROIT

Receipts of bituminous coal maintain good volume. Anthracite is not plentiful. Lake movement starts.

Bituminous—Shipments of bituminous coal are holding good proportions, the receipts providing comfortably for requirements of the Detroit market, which at present are chiefly from users of steam coal. The movement of bituminous is not unduly large, however, and it continues to be almost impossible to locate free coal on tracks in or around the city. The demand from manufacturing and industrial plants continues in a satisfactory degree, and buying proceeds with much regularity, maintaining a steady tone in the market.

The greater part of the coal apparently is going to steam plants, and a few are reported to have been moderately successful in accumulating reserve stocks. Many have no facilities for storing coal in quantity greater than is needed for a few days' supply, their requirements necessitating regular receipts to avoid suspension of operation.

Some of the retail dealers are reported also to have obtained a fair amount of bituminous for supplying needs of household consumers. The customers, however, are rather slow to place orders.

Anthracite—Household consumers are finding it difficult to get anthracite. The quantity of coal coming into Detroit is less than was expected, and few dealers have been able to fill orders as received. Some are declining to receive orders which they cannot fill immediately. With the market deprived of Pocahontas and New River coal, those who have been using smokeless stock are added to the number who rely on anthracite. The controversy between Detroit coal dealers and W. K. Prudden, Michigan fuel administrator, in reference to the amount of margin permissible on coal delivered to domestic consumers, continues unsettled and is said to be responsible for inactivity in the matter of providing for next winter's needs of household consumers.

Lake Trade—Ice is still blocking the St. Clair River. Considerable ice still remains in St. Marys River, while the Straits of Mackinac are clear. The movement of coal over the lake route has already started, and more than a half dozen freighters loaded at Lake Erie ports have arrived in the Detroit River, where they are awaiting the opening of the St. Clair River. No attempt will be made to force an opening, risk of damage to the ships being too great.

COLUMBUS

Domestic demand is strong in every section. Steam business is rather quiet as mine-run is still quite plentiful. The lake trade is opening in a burst of activity.

The coal trade in Ohio has been rather active during the past week. This is due primarily to the good demand for domestic sizes which is reported from every section. Consumers are taking the advice of operators and Federal and state officials and are laying in their fuel for the coming winter. Dealers have been doing a much larger business than usual during the month of April, and consequently there is an outlet for the total production. On the other hand steam business is rather quiet because of a large production of mine-run. The tone of the market is good and future prospects are bright.

The steam business is in a peculiar shape, which is somewhat unusual for this time of the year. Practically all large users have accumulated reserve stocks which exhaust their storage spaces. The smaller users are still buying from the open market, but their requirements are generally light. The railroads are also good purchasers as they are stocking up at every available point. But on the whole the large amount of mine-run on the market has become somewhat of a

drug and some is being sold at lower than the market price.

Retail trade is active in every way. Dealers have all available trucks and teams at work as domestic users are anxious to get in their next winter's stock of fuel. As a result the movement from the yards to the bins and cellars is exceedingly good. The greater bulk of the domestic trade is in Ohio-mined varieties from the Hocking Valley and Pomeroy Bend districts. Little Pocahontas is arriving in the local market. Anthracite is also a scarce article at this time. Retail prices are firm at the levels which have prevailed for some time.

The lake trade is now formally opened and coal is moving from Ohio and West Virginia districts to the lower lake ports. Quite a few vessels have been loaded and will be moved soon. Reports from the Northwest show that the docks are pretty well cleaned up with the exception of mine-run and slack. The Lake Pool will rush as large a tonnage to the upper lake region as possible.

Production in Ohio fields has not been up to the records of previous weeks. This is due largely to a shortage of cars. Strenuous efforts are now being made to get a better car supply, but so far have not met with success. In the Hocking Valley the output has averaged about 65 per cent. of normal and the same figures are reported from Pomeroy Bend. In eastern Ohio the output is still curtailed by shortage of transportation facilities.

CINCINNATI

Small deliveries, on account of car shortage, continue to worry trade, as demand is insistent and record-breaking spring business could be handled if coal were available.

The extreme car shortage at mines in West Virginia and eastern Kentucky continues at this writing, to the detriment of the entire trade and of consumers as well. With a car supply averaging only two or three days a week, mines cannot forward coal to take care of the demand which dealers and agents are receiving from all quarters, and the storage of coal, for which the public is ready, cannot therefore proceed as desired. Action by Federal authorities under which railroads will hereafter not be permitted to dictate coal prices in return for furnishing cars is expected to help the situation materially, by giving all mines participation in the supply of cars available; but so far this effect, resulting from a relief measure which should have been taken long ago, has not had time to make itself felt. In the meantime, with domestic and industrial consumers alike wanting coal both for immediate consumption and for storage, the trade is unable to supply the demand, on account of the non-arrival of fuel in anything like normal quantities for the spring season. The urgent advice of coal men and of the Fuel Administration to consumers to store coal against next winter's requirements has been taken fully to heart, and orders have been placed in unprecedented volume; but deliveries against these orders cannot be made in any quantity, for the reasons indicated.

LOUISVILLE

Domestic demand continues strong. Demand for steam coal checked somewhat. Buyers refusing contracts and buying on open market. Labor and car situations both bad.

There has been some slight improvement shown in the car supply in eastern Kentucky, which is now relatively 51 per cent. of requirements. However, mines are not operating more than about 40 per cent. capacity, and labor is much dissatisfied and shifting from place to place in an effort to secure steady employment. There is an active demand for domestic coal, but dealers are asking for 4-in. block and are refusing small coal, while in steam coal the demand is for clean run-of-mine. Steam coal is rather draggy and industrial plants are not laying in supplies.

The western Kentucky situation is almost the same, except that some of the small mines (wagon mines, etc.) have been having trouble in securing markets and have been selling some coal at less than the mine price in an effort to create business. The larger operators have not been having much difficulty in creating markets. However, contracts can only be offered at the same figures as upon the open market, and industrial consumers of steam coal are laying off for the present and refusing to sign up season contracts.

BIRMINGHAM

Domestic market strong and supply short and hard to obtain. Steam trade good, though the situation is somewhat easy, with consumption and production nearly on a parity. Production heavy, as a whole, but far below plant capacity.

There is strong and heavy demand for lump coal and other domestic sizes from every quarter of the Alabama zone. Dealers are having great difficulty in securing coal for stocking and are making slow progress along that line. Many yards in the district have only one or two cars on hand, and although householders are not showing much concern about laying in winter requirements sufficient orders are coming in to most of the dealers to prevent any accumulation. Dealers' prices as announced by the local fuel board allow a gross margin of \$2.50 per net ton on mine prices plus freight and switching charges, retail prices ranging from \$5.25 to \$6.85 per ton.

The steam trade is holding up well and the demand is good, though the situation is characterized as easy, some instances being reported of deliveries being temporarily suspended by consumers. However, there is little chance for stock accumulation under existing operating conditions.

Complaint is general in regard to the indifference shown by mine workers to regular working schedules, and undoubtedly the bulk of the shortage in output in this field is attributable to this cause. Representatives of the Alabama operators are now in Washington in conference with the Fuel Administration in regard to a further readjustment of wages, but the consensus of opinion is that increased compensation will not serve to increase the production of coal; rather it will hinder it. Labor has registered no complaint against the present schedules.

Coke

CONNELLSVILLE

Car supplies continue irregular. No important improvement since early March. Vagaries in reporting car supplies.

Car supplies in the Connelleville coke region have continued irregular, being on some days approximately double the supplies of other days, and operators have a hard time maintaining their work. It is still necessary to hold coke in ovens longer than is good for it, with resultant deterioration of quality, but the situation is not altogether as bad as it was a month ago.

Of late the railroads have sometimes figured their car placements not against the full rating of the operation, but against the number of cars the operation could use. If, for instance, an operation running full is rated at 10 cars a day and it has half its ovens out, a five-car supply might be called "100 per cent." The divergence from the old method of figuring car supplies is not universal, but it has obtained often enough to confuse the figures. As a rule operators find that their loadings, averaged for a week, fall short of the reported "car supplies" on the individual days of the week, averaged together. This divergence impressing on their customers, and friction has resulted, blast furnaces feeling, on the basis of railroad reports as to car supplies, that they ought to be receiving more coke than the operators furnish.

On the whole it can hardly be said that car supplies have increased materially since early in March, and coke shipments are still 10 to 20 per cent. below the furnace requirements. There are not nearly so many furnaces banked as formerly, but many are gaited and are not turning out their maximum product. The Carnegie Steel Co. has put in operation all its banked furnaces, now operating 49 of its 59 stacks, but some of the 10 idle furnaces it would blow in if coke were available. A Valley interest has sought coke in the open market for more than a fortnight, to blow in an idle furnace, but has not accumulated enough to justify putting the stack in blast.

The market, such as there is, remains quotable at the set prices: Furnace, \$6; 72-hour selected foundry, \$7; crushed, over 1-in., \$7.30, per net ton at ovens. The Fuel Administration in a recent ruling called attention to the fact that to be sold as "72-hour selected foundry" coke must really be selected according to the usual trade practice.

The "Courier" reports production in the Connelleville and lower Connelleville region in the week ended Apr. 13 at 334,291 tons, an increase of 1226 tons, and shipments at

314,376 tons, a decrease of 8022 tons. While there was a decrease in shipments, which were less than reported production, it was the week in which a "100 per cent. car supply" was reported for each of the first three days.

Buffalo—All coke is hard to get. The contracts of last year have mostly expired and cannot be renewed. At the same time the coke producers are handicapped by the scarcity of cars, while at the same time they must sell all their output at the Government prices of \$6 or \$7 at the ovens. Some of the furnace companies, directly or through auxiliary companies, make more coke than they need and are selling it to others. A residue of fine stuff, called "coke breeze," is obtained by jobbers, who sell it to consumers mostly for making steam, as it mixes well with coal for that purpose. It is practically impossible for jobbers to get beehive coke to sell.

Middle Western

GENERAL REVIEW

The general situation clarified by the ruling of Dr. Garfield on railroad coal.

Since Apr. 1 the situation in the Middle West has been in a turmoil because of the attitude of the railroads regarding their fuel supply for the coming year and has been instrumental in decreasing tonnage in this section. Evidences of discontent are noticeable among the miners. Many are changing from one mine to another; some are going to the farms, expecting to return to the mines in the fall; others want to work on the solid instead of in machine mines. In mines where they work on the solid they claim they can make more and easier money than by loading coal after it is machine-cut.

Working time during the past week did not exceed 60 per cent. full time, and many mines report that they only worked two days the past week, or 33 per cent. full time. During the week several large contracts were closed for southern Illinois coal which called for shipments to be made in the Chicago switching limits.

Market conditions are bullish on any good grade of well prepared size coal, but the slack and screenings market is stagnant. Few storage orders for fine coal have been placed as yet, and the situation is that of a begging market on the finer steam sizes. No doubt within the next few days this condition will be bettered, as it is expected there will be considerable buying by the railroads of fine coal as soon as they are thoroughly convinced they will be compelled to pay the Government price, which now seems almost certain.

MILWAUKEE

Dealers and consumers of coal anxious for more light in regard to orders for future delivery. First cargo expected within a few days.

Little new can be said of the coal situation at Milwaukee. At the present time there appears to be a surfeit of administration and a woeful lack of information. Consumers are being importuned to place their orders for coal at once if a coal famine is to be avoided next winter, and on the other hand dealers are being exhorted to speed up deliveries. The problem which faces the consumer is to know just what he can order. He has been told that there will only be a limited quantity of anthracite, that there will be no Pocahontas, and that he cannot get hard coal if he has been burning soft heretofore. The dealer is equally in the dark on these points and is puzzled to know how he can speed up deliveries when there is no coal to deliver. Authentic information regarding supply and price is needed to clarify the situation.

Scores of complaints have been registered that dealers are refusing to accept orders, not knowing how much coal they will be able to get and when they would receive it. Others refuse orders because the customers are slow in paying. To meet the latter objection a movement is on foot to help finance consumers who have not been able in the past to put in their entire fuel supply at one time.

Coal yards will be allowed to supply consumers who provide their own delivery conveyance provided the regulation questionnaire is filled out. Considerable coal is dispensed in this way.

The first cargo by lake is expected to reach port before the close of the month. All yards are making preparations as if a liberal supply of coal was expected at the start.

CHICAGO

Domestic trade is buying heavily. Movement of size coal to the consumer satisfactory.

Satisfactory conditions prevail among domestic dealers as far as their ability to get and deliver Illinois and Indiana coal is concerned. The present demand for well-prepared sizes is such that the yards are having all they want to do. No doubt the occasion for this unusual spring demand is the result of the campaign that has been waged by the state and local fuel administrators, urging the public to get its coal early and not be caught like last winter. Another helpful feature is the continued winter-like weather, necessitating more or less heat in all office and apartment buildings.

Quotations in the Chicago market are as follows, per net ton f.o.b. cars at mines:

	Williamson and Franklin	Saline and Harrisburg	Fulton and Peoria	Springfield	Cartersville	Grundy, La Salle, Bureau and Will
Steam lump.....	\$2.65@2.80	\$2.65@2.80	\$3.05@3.20	\$2.65@2.80	\$2.65@2.80	\$3.35@3.50
Domestic lump.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Egg or furnace.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Small egg or nut.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Stove.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Chestnut.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Pea.....	2.65@3.00	2.65@3.00	3.05@3.20	2.65@3.00	2.65@3.00	3.35@3.50
Washed egg.....	2.85@3.00	2.85@3.00	3.05@3.20	2.65@3.00	2.85@3.00	3.35@3.50
Washed stove.....	2.85@3.00	2.85@3.00	3.05@3.20	2.65@3.00	2.85@3.00	3.35@3.50
Washed nut.....	2.85@3.00	2.85@3.00	3.05@3.20	2.65@3.00	2.85@3.00	3.35@3.50
Min-run.....	2.45@2.60	2.45@2.60	2.85@3.00	2.45@2.60	2.45@2.60	3.10@3.25
Screenings, over 1 in.....	2.20@2.35	2.20@2.35	2.45@2.60	2.20@2.35	2.20@2.35	2.85@3.00
Washed slack.....	2.15@2.30	2.15@2.30	2.50@2.65	2.50@2.65	2.15@2.30	2.85@3.00

The supply of anthracite coal coming into the Chicago market is light. There is no other eastern coal whatever, due to the zoning system. It is generally understood that all the anthracite coming into this market will be via lake, and that system of transportation did not open until this week. Meanwhile the all-rail movement has been extremely light.

ST. LOUIS

Market continues weak on standard coal, both steam and domestic. In a general way conditions show some improvement, especially in high grade. Transportation has been extremely slow and discouraging and railroads show no inclination to speed up. Car supply still short. Railroads not buying and steam users are trying to drug the market. No outside coals.

The local situation is a peculiar one, inasmuch as it is impossible to get enough Cartersville coal to take care of anywhere near the demand, even at the higher retail prices. The retail trade is not buying anything but the Cartersville at the present time, with the exception of such anthracite as may come in. The great problem right now is to get Cartersville in sufficient quantities to take care of the orders now on file, and everything indicates that the tonnage of this coal, small as it is now, will diminish as time goes on.

One of the greatest handicaps in the getting of Cartersville coal is the unwarranted neglect to move that coal into the St. Louis market on the part of the carriers. It takes the Iron Mountain R. R. from two to three weeks to move a car of coal less than 100 miles. The Illinois Central is almost as bad, and in a general way indications are that the carriers in this section are not trying to do their best in the movement of fuel. Not only are the carriers that way, but the Terminal Association is not giving the service that it should under present conditions. The car supply in the Cartersville field is extremely bad.

There is practically no coal coming into this market from the Duquoin district at the present time. The car supply is bad, but some railroad coal is going out.

In the Mt. Olive field conditions have improved the last week. Practically all the coal available is moving forward and finds a ready market at the maximum price, the same as the coals from the Cartersville and Duquoin districts. The car supply and working conditions in this field are extremely good and there is nothing to complain of.

In the Standard field the same lagging conditions continue. The Missouri & Ohio

and Illinois Central are in bad shape for car supply, giving the mines only two days a week, and the movement of this coal is not good.

Throughout the field there is a scarcity of orders and screenings have gone as low in this market as \$1.65, with min-run at \$1.90 and lump coal as low as \$2.25. This is principally for coal moving into St. Louis proper.

If the scarcity of Cartersville continues then the market for Standard will improve, but there is little retail domestic demand for Standard coal. The steam condition here is one that would indicate that large buyers are playing the market for low prices by holding off buying for several days, thus forcing it down.

There is little anthracite moving in and practically no Arkansas.

GREAT FALLS, MONT.

Retail prices lowered 10c. per ton.

An order issued by the Cascade County fuel committee reduces the price of coal to local consumers 10c. per ton. The dealers get an increase on the gross margin of profit, but the difference comes through the reduction of 30c. at the mines. Following are the margins of profit allowed the dealers: Unforked, load lots or over, \$1.75; less than load lots, \$1.95 forked, load lots or over, \$1.95; less than load lots, \$2.20; mine-run, \$1.50; steam coal, \$1.40 per ton. Coal deliveries of less than one ton 25c. added in addition to the one-ton price. Retail prices are as follows. First figure is for unscreened coal, and the second figure for screened coal: Sand Coulee, \$6.22-\$6.42; Bear Creek, \$8.07-\$8.37; Wyoming, \$8.44-\$8.75; Owl Creek, \$8.55-\$8.85; Roundup, \$7.71-\$8.

SEATTLE

Retail coal prices in Seattle advance from 25c. to \$1 a ton. New coke prices announced. Dealers overcharges of \$7000 recovered.

Forty-four varieties of coal are listed in the new Seattle retail price list for coal just made public by the State Fuel Administrator, David Whitcomb. There are no decreases from the prices charged during the winter just past. Instead, increases range from 25c. to \$1 a ton, depending upon the class of coal and the place of delivery. According to the district of delivery the prices are as follows:

Carbonado lump nut.....	\$9.60@10.90
Hyde lump nut.....	9.60@10.90
National lump.....	9.35@10.65
National splint lump.....	8.60@9.90
Standard lump nut.....	9.60@10.90
Roslyn lump egg.....	8.15@9.45
Queen lump egg.....	8.15@9.45
Wellington Ladysmith lump.....	10.00@11.30
Wellington Ladysmith nut.....	9.00@10.30
Wellington Nanosee lump.....	10.10@11.40
Wellington South Wellington lump.....	10.45@11.75
Wellington South Wellington nut.....	9.70@11.00
Grand Ridge lump nut.....	8.00@9.30
Issaquah lump nut.....	8.35@9.65
Newcastle lump nut.....	8.35@9.65
Renton lump nut.....	8.40@9.70
Tono lump nut.....	7.45@8.75
Mendota lump nut.....	7.15@8.45
Diamond briquette.....	9.80@11.10
Black Diamond mixed steam.....	8.60@9.90
Carbonado mix d steam.....	8.75@10.05
Franklin mixed steam.....	8.60@9.90
Gal Creek mix d steam.....	8.75@10.05
South Prairie mixed steam.....	8.75@10.05
Standard mixed steam.....	8.75@10.05
Carbonado straight steam.....	8.30@9.60
Hyde straight steam.....	7.75@9.05
Navy straight steam.....	7.25@8.55
Kangley straight steam.....	7.50@8.80
Pocahontas straight steam.....	7.95@9.25
Standard straight steam.....	8.30@9.65
Wellington Ladysmith steam.....	7.65@8.95
Wellington Nanosee steam.....	7.25@8.55
Wellington South Wellington pea.....	8.30@9.60
Roslyn mine-run.....	7.75@9.05
Queen mine-run.....	7.75@9.05
Grand Ridge pea.....	5.45@6.75
Issaquah pea.....	6.50@7.80
Newcastle pea.....	6.50@7.80
Newcastle buckwheat.....	6.25@7.55
Issaquah buckwheat.....	6.25@7.55
Issaquah sludge.....	4.50@5.80
Newcastle sludge.....	4.50@5.80
Tono mine-run.....	6.35@7.65

The market here, with the exception as noted above, is about as follows:

	Williamson and Franklin County	Mt. Olive and Staunton	Standard
6-in. lump.....	\$2.65@3.00	\$2.65@2.80	\$2.65@2.80
3x6-in. egg.....	2.65@3.00	2.65@2.80	2.65@2.80
2x3-in. nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 2 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 3 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 4 nut.....	2.65@3.00	2.65@2.80	2.65@2.80
No. 5 nut.....	2.15@2.40	2.15@2.40	2.15@2.40
2-in. serge.....	2.15@2.40	2.15@2.40	2.15@2.40
2-in. lump.....	2.50@2.65	2.50@2.65	2.25@2.50
3-in. lump.....	2.50@2.65	2.50@2.65	2.25@2.50
Steam egg.....	2.35@2.50	2.35@2.50	2.25@2.40
Mine run.....	2.45@2.60	2.45@2.60	2.45@2.60
Washed:			
No. 1.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 2.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 3.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 4.....	2.65@3.00	2.65@3.00	2.65@3.00
No. 5.....	2.15@2.30	2.15@2.30	2.15@2.30

Williamson & Franklin Co. rate is 87½c.; other fields, 72½c.

HELENA, MONT.

Mine prices in Montana are reduced 30c. a ton on lump coal and 5c. a ton on mine-run. Trade confused by three price changes in one month.

Lump coal is now \$3.75 a ton at the Montana mines. Run-of-mine is \$3.10, while the price of slack remains unchanged at \$1.95. This is a reduction of 30c. a ton on lump and 5c. a ton on mine-run, making the prices, including jobbers' commission: Lump coal, \$3.90; mine-run, \$3.25, and slack, \$2.10 a ton. This change and the changes made in the Wyoming and Utah mines make the prices uniform in the three districts. Wyoming lump was lowered 20c. a ton and run-of-mine was increased 15c., while slack was increased 25c. Utah lump has been increased from \$3.30 to \$3.75; mine-run from \$3.05 to \$3.10, and slack has been cut from \$2.80 to \$1.95.

The Montana coal trade has been confused as a result of three orders from the National Fuel Administration since the first of March, changing the prices of coal. The first was a reduction of 15c. a ton paid the miner effective Mar. 1. The second was a reduction of 15c. effective Mar. 15, while the third was a further reduction of 15c. a ton to the consumer through the elimination of the jobber. In addition a fourth order was received on Apr. 5 which countermanded the third order.

Coke producers in this state have been permitted to charge \$7.50 a ton for gas coke f.o.b. cars at ovens, \$10 a ton for blast-furnace and smelting coke made in beehive or byproduct ovens, and \$11 for 72-hr. selected foundry coke made in beehive ovens. These prices will result in an increase of 50c. a ton in the byproduct smelting coke, and a decrease of \$1 to \$2 a ton in the coke produced at the beehive ovens at Wilkeson, Carbonado and South Willis.

To date the state fuel administrator has recovered \$7000 in overcharges made by coal dealers above the maximum prices set for coal by the National Fuel Administrator, and is being held by him for ultimate refunding to the consumer. Prosecutions under this recovery will not be undertaken, as many of the overcharges were made because changes in prices had not been given to many dealers. Violations by jobbers of the ruling which until Apr. 1 limited their gross profits to 15c. a ton appear also to be due to misunderstanding of the ruling. All violations hereafter will be prosecuted, however, the state administrator promises.

Six thousand tons of coal were recently purchased by the State Board of Control for its various institutions from the following companies: Roslyn Fuel Co., Roslyn Cascade Coal Co., South Willis Coal Co. and the Superior Coal Company.